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KOTTE (W.). **Krankheiten und Schädlinge im Gemüsebau und ihre Bekämpfung. Zweite völlig neubearbeitete Aufgabe.** [Diseases and pests in market-gardening and their control. Second completely revised edition.]—iv+280 pp., 8 col. pl., 186 figs., Berlin, Paul Parey, 1952. Board DM. 24, linen 27.

A thorough revision of this treatise, first published in 1943, was necessitated by recent advances in the application of the latest chemical and technical developments to the control of vegetable pests and diseases in Germany. The aim of the book, which is divided into four sections, is to treat the principal pathogens in detail.

Section A (pp. 1–3) explains the economic importance of plant protection in vegetable culture. The etiology of bacterial, fungal, and virus diseases, insect pests, and environmental factors, comprising climate, soil, and toxic chemicals, is discussed in section B (pp. 3–34). Section C (pp. 34–225) deals first with pathogens attacking several different crops and then with the diseases and pests of specific vegetables, together with tomato, chilli, and eggplant, spices, and mushrooms. Plant-protective measures treated in section D (pp. 226–265) [cf. *R.A.M.*, 31, p. 584] include rational cultural practices, soil disinfection, seed treatment, and spraying and dusting. Section E (pp. 265–280) consists of a key for the determination of the principal diseases and pests and an index.

ROBERTS (E.) & RAMASARMA (G. B.). **Amino acids of Turnip yellow mosaic virus.**—*Proc. Soc. exp. Biol., N.Y.*, 80, 1, pp. 101–103, 1 fig., 1952.

At the Wernse Laboratory of Cancer Research, Washington University School of Medicine, St. Louis, Missouri, the amino acids of the protein of crystalline turnip yellow mosaic virus [*R.A.M.*, 28, p. 261] were studied by the paper chromatographic and microbiological procedures described in *Proc. Soc. exp. Biol., N.Y.*, 74, p. 237, 1950. The protein contained large amounts of serine, threonine, and proline.

DRECHSLER (C.). **Production of zoospores from germinating oospores of Pythium ultimum and Pythium debaryanum.**—*Bull. Torrey bot. Cl.*, 79, 6, pp. 431–450, 8 figs., 1952.

The developmental features of germinating oospores of *Pythium debaryanum* and *P. ultimum* [*R.A.M.*, 26, p. 131], studied at the Plant Industry Station, Beltsville, Maryland, are described from two cultures of the latter isolated from cabbage and sweet potato in 1924, and one of *P. debaryanum* from pea. Maize meal agar

plates were stored for two to four months at room temperature, being kept under glass jars to prevent drying-out. When transferred to pure water at room temperature oospores from these cultures gave out germ-tubes. At 10° C. the germ-hyphae produced two or three sporangia, 7·5 to 20 μ in diameter, which gave out zoospores.

The author is able to distinguish between the two species as follows. The yellowish inner layer of the oospore wall is thinner in *P. debaryanum* by about 0·4 or 0·5 μ, as is also the oogonial wall, and the antheridia are liable to disappear earlier than in *P. ultimum*. The oospores of *P. debaryanum* usually show the internal changes which accompany after-ripening slightly later, and fewer oospores are ready for germination after 90 days' storage. The empty evacuation tube is generally shorter in *P. debaryanum* than in *P. ultimum*.

P. deliense [ibid., 13, p. 599] appears to be a synonym of *P. aphanidermatum*.

Schlösser (L.-A.). **Viröse Rübengelbsucht an Samenrüben. I. Die Bedeutung des Infektionszeitpunktes für Samenertrag und Samengüte.** [Beet yellows virus on seed Beets. I. The importance of the actual time of infection for seed yield and quality.]—*Phytopath. Z.*, 18, 1, pp. 114–120, 1951. [Received 1952.]

Evidence is adduced from the author's experiments at Einbeck, [Schleswig-Holstein], to show that the average seed yield per plant of sugar and fodder beets decreases in proportion to the earliness in the development in the host of infection with a mixture of yellows and mosaic viruses [*R.A.M.*, 30, p. 209; 31, p. 586]. The yield reductions are considerably heavier in sugar beet (selection E, Rabbethge and Giesecke Original) than in fodder beet (Peragis rote Walze). For instance, the yields (in gm. of seed per plant) from healthy sugar beets and those infected in the early summer of the second year, the late autumn of the first year, and the summer of the first year were 121, 82, 26, and 10·5 respectively, the corresponding figures for the fodder variety being 120, 85, 44, and 20. Early infection also leads to greater deterioration in seed quality; thus, in the above-mentioned infection groups the 1,000-cluster weights of sugar beet were 14·8, 13·6, 10·2, and 9·5 gm., respectively, the percentages of clusters germinating 81, 63, 53, and 38, and the numbers of developing embryos in them after seven days 137, 102, 85, and 55.

Important precautions for excluding yellows from seed crops are the decontamination of the stecklings before storage and the regulation of temperature in steckling clamps [cf. ibid., 31, p. 160], while in areas threatened by the disease the beet crop should be grown in particularly fertile soil and all the necessary cultural practices adopted to ensure vigorous development.

Miller (P. R.). **Materials for heat treatment of Peas and Beans. Combined seed treatment and seed inoculation studies with Soybeans.**—*Agric. Chemic.*, 7, 4, pp. 87, 89, 91, 123, 1952.

This information concerning the heat treatment of peas and beans in carbon tetrachloride and treatment of soy-bean seed with arasan, combined with inoculation with nitragin has already been noticed from other sources [*R.A.M.*, 30, p. 503; 31, p. 313].

Generalov (G. F.). **The results of varietal trials with Peas in the East.**—*Selekcija i Semenovodstvo (Selection and Seed Growing), 1950*, 12, pp. 58–61, 1950. [Russian. Abs. in *Plant Breed Abstr.*, 22, 1, p. 159, 1952.]

Several pea varieties accepted for growing in the Transural, Siberia, Kazah ASSR, and Kirgiz ASSR are listed with notes on features including yielding capacity, earliness, and resistance to *Ascochyta* [? *pisi* and *A. pinodella*: *R.A.M.*,

22, p. 6] and other [unspecified] diseases. Grad Amurskiĭ (Amur Hail) was the most resistant to *Ascochyta*.

KERLING (L[UISE] C. P.). **Beschadiging en schimmelaantasting bij Erwten als gevolgen van nachtvorst.** [Damage and fungal attack on Peas as consequences of night frost.]—*Tijdschr. PlZiekt.*, 58, 2, pp. 29–54, 10 figs., 1952. [English summary.]

At the Phytopathological Laboratory, Wageningen, Holland, ten-day-old Rondo pea plants in pots or in sterile tubes were exposed for 16 hours to a temperature of −3° to −4° C. and then placed in an incubator at 15° to 20°, thereby simulating the night and day temperatures liable to occur during the last week of April and throughout May. After exposure to frost some of the plants were inoculated with one of the following fungi: *Botrytis cinerea*, *Sclerotinia sclerotiorum*, *Fusarium avenaceum*, *F. solani*, and *Ascochyta pinodella* [*R.A.M.*, 31, p. 471 and cf. next abstract]. In other tests seeds were sown in infested soil or treated with spore suspensions before sowing.

Plants grown under sterile conditions in tubes suffered little damage from either *B. cinerea* or frost alone, but a combination of the two proved lethal. The hyphae rapidly penetrated the stem and root tissues and the plants were overgrown within a week. In potted frozen plants invasion was much slower, the epicotyl and lower internodes turning dark and shrinking only after six or seven weeks, while the upper part was still green. Shortly afterwards the shoots collapsed. Conidia developed on the discoloured areas of the stem; the vascular bundles assumed a deep red tinge. These symptoms are typical of the field picture during June, and were also observed on plants grown in contaminated soil or raised from inoculated seed; in these cases, however, many seedlings were killed before emergence.

Non-frozen plants were barely infected by *S. sclerotiorum* [ibid., 18, p. 153], which was highly pathogenic, on the other hand, to those exposed to low temperature. Sclerotia were produced on the sterile plants in tubes, but the tissues of the potted seedlings were not penetrated by *S. sclerotiorum*, which was replaced by *B. cinerea* and species of *Trichoderma*, *Aspergillus*, and *Fusarium*. Field material seldom yields *S. sclerotiorum*.

The symptoms induced by *F. avenaceum* on frozen plants in pots were similar to those of *B. cinerea*, consisting in a brown discoloration of the cortex and reddening of the vascular bundles. In contaminated soil the effects of the fungus were much more severe on the plants exposed to frost than on those not so treated.

In tests with a very virulent strain of *F. solani* [? f. *pisi*: ibid., 31, p. 471] the non-frozen plants sustained little or no injury, while the roots of those subjected to low temperature became flaccid and rotted slowly, the leaves turned yellow, and ultimately death ensued.

Ascochyta pinodella was the most aggressive of the fungi investigated, attacking healthy plants as well as those weakened by frost and spreading rapidly through the cortex, especially under conditions of high temperature and humidity [cf. ibid., 31, p. 587].

Seed treatment with phygon stimulated plant growth in the Unica variety and minimized the susceptibility of the cotyledons to soil fungi. The longer the plants retained their food reserves the greater was their resistance to low temperature and fungal infection. Another factor besides frost tending to lower the resistance of pea tissues to pathogenic fungi is water congestion [cf. ibid., 28, p. 25]. The entry of the organisms is probably facilitated not only by the changed air to water ratio, but also by the accompanying disturbance in the normal gaseous exchange between the cells and the intercellular spaces, leading to the development of increased cell permeability combined with reduced osmotic pressure.

RÜMKER (ROSMARIE v.). **Über die Ökologie von Ascochyta pinodella und Fusarium culmorum in der Rhizosphäre anfälliger und nicht anfälliger Pflanzen.** [On the ecology of *Ascochyta pinodella* and *Fusarium culmorum* in the rhizosphere of susceptible and non-susceptible plants.]—*Phytopath. Z.*, 18, 1, pp. 55–100, 5 figs., 4 graphs, 1951. [Received April, 1952.]

In further studies at the Phytopathological Institute, Bonn, two methods were adopted in the approach to the problem of pea infection by *Ascochyta pinodella* [cf. preceding abstract] and *Fusarium culmorum* [ibid., 29, p. 409]. One involved the growth of the test plants, comprising garden peas, field peas (*Pisum* [*sativum* var.] *arvense*), *Vicia pannonica*, maize, wheat, and colza (*Brassica napus oleifera*), in pots of infested soil, and the other the reproduction, under controlled conditions, of the individual parts of the natural disease complex.

No correlations could be established in inoculation experiments in different soil types between the susceptibility or resistance of a plant species to the two pathogens and the presence or absence of a stimulus to the growth of the latter in the rhizosphere of the species concerned. There was no connexion, moreover, between the degree of injury inflicted by either of the fungi on the stand preceding peas in the rotation and the development of disease in the following pea crop. The resistance of *V. pannonica*, maize, wheat, and colza to *F. culmorum* was weaker in sand and in soil mixtures with a high proportion of sand than in arable soil and compost. Although the presence of peas did not materially increase the soil population of *A. pinodella* or *F. culmorum*, their influence on the substratum was unfavourable to themselves. On the other hand, the numbers of *A. pinodella* in the rhizosphere of the non-susceptible and therefore ostensibly innocuous maize increased appreciably.

Root resistance to the two pathogens was shown to be conditioned by the microflora of the rhizosphere, and also by infection-repellent principles residing in the root itself. The damage caused by *F. culmorum* is due in the first place to the excretion of toxic metabolic products (built up mainly from carbohydrates), which need not extend beyond the root surface of a given plant, whereas *A. pinodella* must actively colonize the root tissue before pathological symptoms can be induced.

The reaction of the different plant species to *A. pinodella* and *F. culmorum* under sterile conditions could be modified by variations in nutritional factors, operating both on the susceptibility or non-susceptibility of the host and on the pathogenicity of the fungi. In some cases the response was altered in a contradictory manner by the addition of cane sugar to the cultures, resistance to *A. pinodella* being weakened and to *F. culmorum* enhanced. The divergent course pursued by the two pathogens in the vicinity of young seedlings was found to be decisively influenced by emanations from the seed.

SILL (W. H.) & WALKER (J. C.). **Cowpea as an assay host for Cucumber virus 1.**—*Phytopathology*, 42, 6, pp. 328–330, 1952.

Of the various plants reacting by local lesion formation to inoculation with certain strains of cucumber virus 1 [cucumber mosaic virus], cowpea [*R.A.M.*, 14, p. 5; 30, p. 135] appeared to be the most promising for quantitative studies at the University of Wisconsin, Madison, but the responses tended to be very capricious, and an investigation was therefore made of the several factors involved in lesion development.

The best source of the virus was provided by tobacco plants inoculated in the three- to four-week stage, grown at 20° to 25° C., and used within a week of the appearance of marked symptoms. Opposite primary leaves reacted almost identically and gave a better assay than half leaves. Rotary motion of a glass spatula with the aid of carborundum proved to be superior to other methods of inoculation, giving equally high lesion counts with less injury to the plants. Primary leaves of

12- to 15-day-old plants developed the highest number of lesions, which declined with advancing age of the plants [cf. ibid., 32, p. 62]. Few lesions were produced on plants maintained at 16° and the increase in the number obtained at 20°, 24°, and 28° was generally insufficient. However, the number was raised to a high level (average of 108 as compared with 36 per leaf) by pre-inoculation darkening of the plants for 24 hours; periods of 36 and 48 hours were injurious [cf. below, p. 167].

Infected cucumber plants were undependable as a virus source for the assay of cucumber mosaic virus because of the presence of an inhibitory substance in their extracts.

NAITO (N.). **On the influence of temperature to germination of urediniospores of Uromyces appendiculatus (Pers.) Fr. parasitic on Bean.**—*Tech. Bull. Kagawaken agric. Coll.*, 1, 3, pp. 14–17, 1951. [Japanese, with English summary.]

In water moderate germination of uredospores of *Uromyces appendiculatus* from bean [*Phaseolus vulgaris*: *R.A.M.*, 31, p. 72] occurred from 10° to 25° C. Between 10° and 20° C. germination started one hour after sowing and was completed after four hours, maximum growth of the germ-tubes occurring at 20°.

HILDEBRAND (A. A.). **Stem canker. A disease of increasing importance on Soybeans in Ontario.**—*Soybean Dig.*, 12, 9, pp. 12–15, 2 figs., 1952.

Stem canker of soy-beans [*Diaporthe phaseolorum* var. *batatatis*: see next abstract] is stated to be the most serious disease affecting the crop at present in Ontario [*R.A.M.*, 32, p. 63], where it had been of little significance for some years before becoming agressive in 1949, especially on the Hawkeye variety. In 1950 the disease became more widespread with the increasing cultivation of Hawkeye, and in 1951 the situation deteriorated still further with the introduction of the even more susceptible Blackhawk. Both these varieties are selections from a cross between Mukden and Richland. However, experimental evidence obtained at the Harrow Laboratory of Plant Pathology suggests that the fungus is soil-borne and may not necessarily have been introduced to any appreciable extent with the seed of the two susceptible varieties. Their continued cultivation would tend to encourage the build-up of soil infestation to a point at which the growing even of relatively resistant varieties would scarcely be practicable. In a comparative test on the A. K. Harrow variety in 1951 the germination of seed from healthy plants was about 8 per cent. higher than that from diseased, but the yield of the latter was more productive than that of the former.

In a varietal reaction experiment in the same year Harman appeared to be the least susceptible, showing only 3·5 per cent. infection on 5th September (when the plants were 113 days old) compared with 24·4, 25·2, and 12·7 per cent. for Blackhawk, Hawkeye, and Monroe, respectively. Next in order of resistance came Harosoy (4·5) and Adams (5·2). There was a marked increase of infection during the period from 24th August to 5th September, amounting to 3 per cent. in Harman and Harosoy, 3·6 in Adams, 10·2 in Hawkeye, 11 in Monroe, and 19·2 in Blackhawk. In representative stands of the different varieties scattered over an almost county-wide area the average percentages of infection in Harman, Lincoln (which developed 9·9 per cent. in the Harrow trial), and Hawkeye were 1·5, 7, and 33·5, respectively.

Diseases in the Minn.-Iowa-Mo. area.—*Soybean Dig.*, 12, 9, p. 15, 1952.

This is the substance of a lecture given by J. M. CRALL, associate pathologist at Iowa State College, at the recent Soybean Processor Conference at Ames, Iowa. In the tri-State area the most important diseases are probably those of the root and stem rot group, comprising stem canker [*Diaporthe phaseolorum* var. *batatatis*: cf. preceding abstract; *R.A.M.*, 31, p. 268], brown stem rot [*Cephalosporium*

gregatum: loc. cit.], *Rhizoctonia* root and stem rot [*R. microsclerotia*: ibid., 31, p. 367], and charcoal rot [*Macrophomina phaseoli*: ibid., 27, pp. 7, 66]. *R. microsclerotia* is of major importance in Minnesota and northern Iowa, while *M. phaseoli* is injurious only in dry seasons in south-east Missouri.

Nearly as troublesome as the foregoing (and in Missouri even more so) are the bacterial leaf spots, including blight [*Pseudomonas glycines*: ibid., 32, p. 114], pustule [*Xanthomonas phaseoli* var. *sojense*: ibid., 31, p. 367], and wildfire [*P. tabacum*: loc. cit.], and the fungal diseases brown spot [*Septoria glycines*: ibid., 29, p. 550] and downy mildew [*Peronospora manshurica*: ibid., 31, p. 45]. Both blight and pustule are co-extensive with the cultivation of the crop in most years, the former usually being more prevalent in Iowa early in the season and the latter towards the middle. Pustule is regarded as a major problem, particularly in south-eastern Missouri, and in epiphytotic years it is commonly followed (after 1st August) by wildfire. Brown spot has assumed an increasingly severe character in the north-central States of recent years. In 1951 it was found nearly everywhere in Iowa and caused about 50 per cent. defoliation in an experimental field at Columbia, Missouri. In the same year downy mildew was widespread in eastern Iowa and central and south-eastern Missouri. Both diseases also occur in Minnesota. Frog-eye [*Cercospora sojina*: ibid., 31, p. 416] was detected for the first time in Iowa in 1951. It appears to be most severe in south-eastern Missouri. The *Phyllosticta* [*glycineum*: ibid., 30, p. 312] and *Alternaria* [ibid., 29, p. 82] leaf spots are generally distributed but of little importance at the moment in the three States.

Of the virus diseases bud blight [tobacco ring-spot virus: ibid., 25, p. 484] has lately declined in prevalence, while [soy-bean] mosaic and [bean] yellow mosaic [ibid., 28, p. 205] have never been serious in the area under observation. On the other hand, potassium deficiency [ibid., 22, p. 463] is becoming more common and may be responsible for heavy losses in some localities unless corrected by appropriate soil amendments.

As regards control, Federal and State experiment station breeding projects are now directed towards the development of selections resistant to three above-mentioned bacterial diseases, downy mildew, purple seed stain [*Cercosporina kikuchii*: ibid., 30, p. 503], frog-eye leaf spot, stem canker, and *Rhizoctonia* root and stem rot. Brown stem rot has been effectively combated by crop rotation, and cultural practices aimed at the conservation of soil moisture are proposed for charcoal rot control.

New Onion disease.—*Seed World*, 71, 7, p. 26, 1952.

During the investigations now in progress at the Colorado Experiment Station, a new, undescribed bacterium was found to be responsible for onion streak, a new disease first observed in 1948, which caused premature death of onion tops in many fields near Rocky Ford in 1949 and 1951. The bacterium is favoured by thrips infestation and moist conditions, extreme damage occurring in fields heavily infested with thrips and at an average temperature of 80° F. or more. It enters wounds in onion leaves and a small, yellow, rapidly lengthening spot develops, turning the flat side of the leaf yellow from sheath to tip. In later stages the yellow area becomes mottled brown and dries, the change apparently being associated with high temperatures as it is very rare in cool weather.

Zacha [V.]. **Zajímavá choroba na Česneku.** [An interesting disease on Garlic.]—*Ochr. Rost.* [*Plant Prot., Prague*], 23, 3, p. 275, 1950.

Heterosporium allii was isolated from diseased garlic samples [*R.A.M.*, 10, p. 159] received in May, 1950, from the Breeding Station at Horní Moštenice, Czechoslovakia. Attention is drawn to the danger of the possible establishment of this disease in *Allium* stocks.

Novák (J. B.). **Nebezpečná choroba skladované Mrkve.** [A dangerous disease of Carrots in storage.]—*Ochr. Rost.* [*Plant Prot., Prague*], 23, 3, pp. 199–205, 4 figs., 1950. [Russian and English summaries.]

Two diseases widespread on carrots in Czechoslovakia are described. *Alternaria radicina* [*Stemphylium radicinum*: *R.A.M.*, 27, p. 399; 31, p. 164], not previously reported from the country, is mainly responsible for serious losses in storage, though easily overlooked because of the development of secondary fungi. It is often mistaken for *A. brassicae* var. *dauci* [*A. dauci*: loc. cit.; ibid., 26, p. 328].

Overell (B. T.). **A toxin in culture filtrates of Sclerotinia sclerotiorum.**—*Aust. J. Sci.*, 14, 6, pp. 197–198, 1952.

As part of the research programme of the Division of Food Preservation, Commonwealth of Australia Scientific and Industrial Research Organization, filtrates of *Sclerotinia sclerotiorum* [*R.A.M.*, 31, p. 292], grown on Czapek-Dox medium (pH 4·8) plus 5 per cent. glucose and 0·25 per cent. yeast extract, were examined for the presence of a diffusible toxin which might kill invaded tissue in advance of the mycelium [ibid., 31, p. 30]. The toxicity of the filtrates was determined by estimating the loss of fresh weight of carrot disks [cf. ibid., 30, p. 207] and increase in reducing substances and organic acids in the filtrate surrounding them.

Up to the 14th day of incubation at 24° C., when the dry weight of the mycelium was at its maximum, no toxin could be demonstrated in the cultures, but with advancing mycelial degeneration leakage from the carrot disks became pronounced and reached a climax on the 32nd day. Paper chromatography of the eluate from a filtrate autoclaved for 20 minutes at 120° (*Aust. J. sci. Res.*, A, 1, p. 98, 1948) revealed oxalic and malic acids, of which the former is believed to be the principal, if not the sole, thermostable toxin. Its concentration was of the order of 10^{-2} M, which would suffice to cause the leakage observed in a filtrate of average activity at pH 3·9.

Research work and workers.—*Seed World*, 71, 8, pp. 40–41, 1952.

It is stated by the U.S. Department of Agriculture that a new head lettuce variety, Alaska, resistant to tipburn [*R.A.M.*, 29, p. 498; 32, p. 115] and ring spot [*Marssonina panattoniana*: ibid., 20, p. 191], has been developed at Beltsville and will be ready for general release in July, 1953.

Pound (G. S.) & Cheo (P.-C.). **Studies on resistance to Cucumber virus 1 in Spinach.**—*Phytopathology*, 42, 6, pp. 301–306, 2 figs., 1952.

Studies connected with a spinach-breeding project initiated in 1947 at the University of Wisconsin, Madison, for the transference of the resistance to cucumber virus 1 [cucumber mosaic virus: see next abstract] of Virginia Savoy to smooth-leaved processing varieties [*R.A.M.*, 30, p. 135], early revealed the marked effect of air temperature on symptom development and severity of infection in both susceptible (such as Nobel) and resistant varieties. In the former a high air temperature not only curtailed the incubation period but increased the lethal effect of the virus, due mainly to necrosis. Thus, inoculated plants were killed in about 80, 28, 22, and 16 days at 16°, 20°, 24°, and 28° C., respectively. This effect was accentuated by high soil temperature, plants grown at air and soil temperatures of 16° and 28°, respectively, succumbed after 25 to 27 days, a fortnight's exposure before inoculation resulting in death after 18 to 20 days. On the other hand, inoculated plants kept at air-soil temperature combinations of 28° and 16° and 28° and 28° died about 26 and 16 days, respectively, after inoculation. Short (eight-hour) day length and low light intensity (400 foot-candles), which retarded host growth, induced more severe symptoms and earlier death than a 16-hour day and high light intensity (1,600 foot-candles) [cf. above, p. 165].

Resistance in Virginia Savoy was manifested at air temperatures of 16° and 20°, but a daily 16-hour exposure to 28° resulted in a breakdown caused by the development of systemic necrosis in the apical meristem. This feature of the disease is not attributable to a high soil temperature, since inoculated plants at the 28°–16° air-soil combination contracted even more top necrosis than those kept at 28°–28°, while complete resistance was maintained at 16°–28°.

Virginia Savoy plants inoculated at temperatures below 28° did not become infected, and in the few reacting positively at 16° and 20° either the virus must have been inactivated or its further multiplication was inhibited, since on transference to 28° no apical necrosis developed and subinoculations rarely yielded the virus. The inhibitory substance present in spinach plants did not suppress the virus in macerated tissue of Nobel plants but did inhibit it in inoculum from some other plant. The inhibitor is not destroyed by the multiplication of the virus in spinach. Extracts from resistant and susceptible plants did not differ in their inhibitory action on cucumber mosaic virus in inoculum taken from tobacco.

Assays of progenies of crosses between the resistant Virginia Savoy and Old Dominion and the susceptible Nobel, Viroflay, and Prickly Winter indicated that resistance to the virus is controlled by a single dominant gene.

Cheo (P.-C.) & Pound (G. S.). **Relation of air temperature, soil temperature, photoperiod, and light intensity to the concentration of Cucumber virus 1 in Spinach.** —*Phytopathology*, 42, 6, pp. 306–310, 1 graph, 1952.

In inoculation tests on cowpea with sap extracts of Nobel spinach plants infected with cucumber virus 1 [cucumber mosaic virus: see above, p. 164] from *Nicotiana glutinosa* and kept at 16°, 20°, 24°, and 28° C., a definite cycle of virus activity was found to operate for each temperature [see preceding abstract]. Thus, at 28° the virus content increased from about the second to the eighth day after inoculation, followed by a rapid decrease until death ensued on or near the 16th day. At 24° there was a gradual increase up to the 11th day, succeeded by a decrease until the plants died about the 22nd day, the corresponding periods at 20° being 13 and 30 days. At 16° progressive increase was up to the 15th day and decrease to the 30th; the plants survived until the 80th day. The temperature affected the rate of the virus cycle more than the virus content. However, the number of lesions obtained at the peak of the cycle from plants at 16° was invariably lower than that produced by inoculum taken at the peaks at other temperatures.

Essentially the same cycle of activity as described for spinach obtained in tobacco. At 28° the concentration reached a maximum about four to eight days after inoculation, while at 24°, 20°, and 16° the peaks were attained at 12, 17, and 23 to 29 days, respectively. The number of lesions obtained from plants at 16° at their maximum virus content was as large as that secured at 28°. The rapid decline in concentration succeeding the peak coincided closely with partial recovery from symptoms, which in turn was followed by a recurrence corresponding to secondary peaks of virus content. The frequency of these cycles was dependent on temperature. In spinach, on the other hand, the decrease of virus after a peak was not accompanied by recovery. Thus, in plants kept at 16° the virus concentration fell after the 17th day but the mosaic symptoms became steadily more severe for two months or so. Moreover, the infected plants, unlike tobacco, made very little new growth.

Hills (L. D.). **Celery—the 'neverwell' crop.**—*Comm. Gr.*, *1952*, 2973, pp. 1149–1150, 1952.

In this brief survey of diseases attacking celery in Great Britain, it is recommended that for checking celery leaf spot (*Septoria apii*) [*R.A.M.*, 29, p. 551] heavier sowings (up to 1½ oz. per 24 sq. ft.) of long stored seed are required, saved

preferably in a year when there was little spot. Heavier, frequent sprayings are advised.

Runov (V. I.) & Eideljnant (N. M.). **The effect of calcium on the structure of leaves and on the physiological processes in Melons.**—Докл. Акад. Наук СССР [*C. R. Acad. Sci. U.R.S.S.*], 73, pp. 397–399, 1950. [Abs. in *Hort. Abstr.*, 21, 4, p. 503, 1951.]

Spraying melon plants with 3 per cent. calcium nitrate in the U.S.S.R. increased the yield and induced resistance to wilt [*Fusarium bulbigenum* var. *niveum*: cf. *R.A.M.*, 8, p. 625; 27, p. 346; 31, p. 418].

Godfrey (G. H.). **Cantaloupe powdery mildew control with dinitro capryl phenyl crotonate.**—*Phytopathology*, 42, 6, pp. 335–337, 1952.

Effective control of cantaloupe powdery mildew (*Erysiphe cichoracearum*) [cf. *R.A.M.*, 26, p. 477; 31, p. 248] was obtained at Substation No. 15 of the Texas Agricultural Experiment Station, Weslaco, by three applications at nine-day intervals of dinitro capryl phenyl crotonate (karathane) [loc. cit.; ibid., 30, p. 321], now available as iscothan [ibid., 31, p. 435] (Innis, Speiden & Co., Inc.), in the form of a dust containing 1 per cent. of the active ingredient. At 20 to 25 lb. per acre the mean incidence of infection was reduced from a disease index of 9·75 to one of 7·5 (in a scale running from 0 to 10), the corresponding figures for 30 to 35 and 45 to 50 lb. being 6·25 and 5·25, respectively. The superior results achieved with the larger quantities are attributed to the coverage of the lower as well as the upper leaf surfaces. In another test the mean indexes for applications of 20 lb. and 35 lb. were 1·44 and 0·4, respectively, compared with 5·72 for the untreated. The chemical exerted an eradicant action, killing mycelium as well as spores, and was further efficient in residual or preventive control. In no case did it injure the foliage. A weekly interval between the treatments would appear to be preferable to one of nine days, especially where sources of infection are general.

Hepler (P. A.) & Kahn (R. P.). **Asparagus rust disease and its control.**—*Food Pack.*, 33, 5, pp. 44, 46, 60–61, 2 figs., 1 diag., 1952.

Most of this information on asparagus rust (*Puccinia asparagi*) and its control in Illinois has already been noticed from another source [*R.A.M.*, 32, p. 58]. To date some 250 plants that have escaped infection are available for re-testing and crossing to obtain progeny for further resistance trials. Crosses have been attempted between cultivated asparagus and the resistant ornamental species, *Asparagus plumosus*, *A. sprengeri*, *A. virgatus*, and *A. scandens* var. *deflexus*. Pending the development of a resistant variety growers can help to reduce the severity of rust epiphytotics [cf. next abstract] by planning their plantings in such a way that new beds are laid down in only one or two years out of ten [cf. ibid., 13, p. 677]. In this way during six of the years there will be no uncut asparagus to act as an agent of teleutospore dissemination in the spring, early summer infection will be eliminated, and outbreaks delayed until late in the season when damage is relatively slight.

Hassebrauk (K.) & Horn (A. v.). **Untersuchungen über die Bekämpfungsmöglichkeit des Spargelrostes (Puccinia asparagi) mit Fungiziden.** [Studies on the possibility of combating Asparagus rust (*Puccinia asparagi*) with fungicides.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 4, 7, pp. 100–103, 3 diags., 1 graph, 1952.

Epiphytotics of asparagus rust (*Puccinia asparagi*) [cf. preceding abstract] similar to those which devastated German cultures from 1928 to 1933 [*R.A.M.*, 13, p. 677], following the simultaneous, widespread re-establishment of plantings

after the 1914–18 war, have developed since 1945, culminating in outbreaks of progressively increasing severity during 1950–1. Experiments on the control of the disease [ibid., 28, p. 560] in one- and two-year-old plantings near Peine, Hanover, by spraying three times from the end of May to the end of June with cuprenoxon and GB48 both at 0·3 and 0·6 per cent. were only partially successful, and it is concluded that fungicidal treatments must be reinforced by other prophylactic measures, especially the prompt and complete burning of tops, if severe yield reductions are to be avoided.

Branas (J.). **Remarques et observations sur la dégénérescence infectieuse de la Vigne.** [Remarks and observations on infectious degeneration of the Vine.]—*Progr. agric. vitic.*, 137, 22–23, pp. 310–324, 9 figs., 1952.

The author points out that the earlier names, such as court-noué, used to designate infectious degeneration of the vine [*R.A.M.*, 27, p. 348; 30, p. 261; 31, pp. 229, 591, *et passim*] cannot be altogether discarded until it has been proved that all the different symptoms which they indicate have one and the same cause. If more than one agent is at work, and the diversity of symptoms indicates that possibility, a consideration of symptoms is important. Leaf laciniation is a somatic mutation, while abnormalities of the veins may be of virus origin. Asymmetrical leaves have always been regarded as a symptom of infectious degeneration, and though they may be associated with mosaic or with vein anomalies there is also some evidence that they may be a normal organic feature. Graft transmission of symptoms has been taken as evidence of an infectious virus, but not only virus diseases are so transmitted.

Hyams (E.). **A note on some hybrid Grape-Vines.**—*Fruit Yearb.* 6 (*1953*), pp. 95–99, 1952.

This list of vine varieties which are resistant to *Uncinula necator* [*R.A.M.*, 30, p. 214] and *Plasmopara viticola* [loc. cit.] and need no protective spraying in England, includes Seyve-Villard 5276, Seibel 5279, Seibel 13053, Ravat Noir 262, Tissier-Ravat 578, and Seyve-Villard 20473.

Yarwood (C. E.). **Latent period and generation time for two plant viruses.**—*Amer. J. Bot.*, 39, 9, pp. 613–618, 2 graphs, 1952.

At the Division of Plant Pathology, University of California, Berkeley, tobacco and bean (*Phaseolus vulgaris*) leaves were inoculated by rubbing with tobacco mosaic virus, washed, dried, detached, and incubated in dark, moist chambers at a constant temperature. At intervals samples were assayed for virus content by lesion counts on bean leaves inoculated with 1 per cent. macerated tissue suspended in 0·5 per cent. potassium phosphate [*R.A.M.*, 31, p. 474]. In the first hour there was a decrease in the amount of virus recovered from tobacco at 31° C. After eight hours the amount increased logarithmically, the generation time (i.e., time required for the concentration to become doubled) being about an hour. Leaves sprayed with virus but not rubbed also showed decrease in recoverable virus during the first hour followed by a period of more or less constant recovery. When 0·1 per cent. mosaic tissue was used as inoculum, instead of 30 per cent., the generation time was shorter. The minimum, optimum, and maximum temperatures for increase of tobacco mosaic virus were about 13°, 31°, and 37°, respectively. The generation time was greater on bean than on tobacco.

For tobacco necrosis virus on bean at 22° and 25°, and on tobacco at 22° the latent period was about 12 hours and the generation time about two. When bean leaves inoculated with either virus were put in water for one hour, within eight hours of inoculation infection was reduced.

Insect-transmitted plant diseases : a symposium.—*Plant Dis. Reptr, Suppl.* 211, pp. 35–55, 1952. [Multilithed.]

In this symposium of papers presented at a joint meeting of the American Phytopathological Society, the American Association of Economic Entomologists, and the Entomological Society of America on 11th December, 1951 that by W. L. Popham on 'The role of insects in the transmission of plant diseases' (pp. 35–36) [cf. *R.A.M.*, 20, p. 218] briefly reviews the history of research into the subject and the problem of control, including the application of quarantine measures. F. O. Holmes deals with the 'Geographical isolation of some viral diseases' (pp. 37–42) with special reference to the danger of the possible and actual introduction of such diseases into other countries. If attempts were made to adapt existing methods of control to diseases not yet found in North America, methods which would apply equally well to diseases already present might be developed. Existing methods need to be supplemented. Danger may arise because losses from diseases with inconspicuous symptoms may escape notice, while those which only reduce the quality or slightly lower the yields of agricultural products may be looked upon as unimportant. Because some virus diseases are not yet world-wide, control measures should be prepared beforehand. Workers should also study the features of and prepare control measures against inconspicuous but costly viroses. C. W. Bennett, discussing 'The origin of new or little known virus diseases' (pp. 43–46) concludes that drastic modification of species and varieties of crop plants will probably be necessary for many years to counteract damage by viruses. It will probably be necessary to rely largely on the discovery or development of resistant varieties to solve the many production problems posed by the increase in numbers and destructiveness of virus diseases. W. F. Turner in a paper on 'The role of insect surveys in virus-vector research' (pp. 47–50) discusses the importance of such surveys in relation to quarantine, rogueing, geographical emphasis in a control programme, timely planting and other cultural practices, and chemical control of vectors [ibid., 29, p. 106]. J. H. Freitag, dealing with 'Insect vector-plant virus relationships' (pp. 51–55), discusses the mode of virus transmission by aphids, leafhoppers, and mandibulate insects.

Lobo (Maria R. C.). **Virus e viroses.** [Virus and viroses.]—*Gaz. Agric. Moçamb.*, 4, 36, pp. 114–119, 9 figs., 1952.

Useful information is summarized concerning the symptomatology, etiology, and control of plant viroses in general, with special reference to two of major economic importance in Mozambique, namely, the tobacco and cassava mosaic viruses [*R.A.M.*, 29, p. 89]. Mention is also made, *inter alia*, of other viruses present in the country [loc. cit.; ibid., 28, p. 560].

Roland (G.). **Sur une mosaïque de Rumex obtusifolius.** [On a mosaic of *Rumex obtusifolius*.]—*Parasitica*, 8, 2, pp. 54–57, 1 fig., 1952.

Inoculations of chilli plants with sap from *Rumex obtusifolius* growing by the roadside at Gembloux, Belgium, and showing a mosaic caused by a virus apparently identical with that reported to cause mosaic of *Rumex* in New Zealand [*R.A.M.*, 28, p. 507] and for which the author proposes the name *Rumex* virus 2, gave rise to necrotic spots on the inoculation sites and pale areas mostly along the veins. Identical spots were obtained, however, with sap (either unheated or kept for 10 minutes at 80° C.) from healthy *R. obtusifolius* plants. When tobacco leaves were similarly inoculated the local necrotic rings which appeared were also attributed to the sap, not the virus. Inoculation with infective *Myzus persicae* and *Aphis rumicis* on tobacco resulted in the development of small, pale spots on the leaves, accompanied by veinbanding.

Plant-quarantine import restrictions.—*S.R.A., B.E.P.Q., U.S. Dep. Agric.*, 175, pp. 62–96, 1950.

The plant quarantine import restrictions [cf. *R.A.M.*, 29, p. 224] in force in Canada, Chile, the Dominican Republic, Finland, France, Great Britain, Guatemala, India, Indonesia, Japan, New Zealand, Paraguay, Saudi Arabia, Trinidad and Tobago, and Venezuela are summarized. The consolidated and revised regulations of the Destructive Insect and Pest Act, Canada [ibid., 28, p. 480], are given. The plant pests and diseases against which measures may be taken in Finland under decree regarding plant infestations No. 309, Helsinki, April 11th, 1947, repealing that of June 5th, 1935, are listed [cf. ibid., 16, p. 576]. The New Zealand schedule of declared diseases is given.

Sanidad vegetal. [Plant health.]—*Bol. Minist. Agric., B. Aires*, 2, 3, pp. 247–258, 1952.

The following are among the provisions of Decree No. 29.357/49, dated 27th November, 1949, in which the 'tristeza' root rot of citrus [*R.A.M.*, 31, p. 382] is declared an agricultural pest. The establishment of new plantings of citrus grafted on sour orange and its varieties, grapefruit, and other susceptible stocks is prohibited throughout the Argentine Republic, except for experimental purposes at official institutions. An embargo is further placed on the production and sale of the above-mentioned graft combinations and on their importation into the country, except for experimental purposes. Duly authenticated health certificates must accompany incoming or outgoing citrus plants grafted on stocks other than the above-mentioned.

Resolution No. 856/49, dated 3rd May, 1949, provides for the suspension of certification of Huinkul M.A. potato 'seed' on account of a severe fusariosis [*Fusarium* sp.] affecting the variety in the south-east of the Province of Buenos Aires.

Cook (A. A.), Larson (R. H.), & Walker (J. C.). **Relation of the black rot pathogen to Cabbage seed.**—*Phytopathology*, 42, 6, pp. 316–320, 2 figs., 1952.

Studies were continued at the University of Wisconsin, Madison, on the development of black rot (*Xanthomonas campestris*) in infected cabbage seed plants and the course pursued by the pathogen in the tissues [*R.A.M.*, 31, p. 585]. Symptoms develop most commonly on the plants after flowering is well advanced, by which time the vascular system is usually invaded systemically. Invasion of the pods is followed by progress into the funicle, which commonly shrivels but remains attached to the seed. The threshing process affords ample scope for superficial seed contamination by organisms in pod walls and seeds. Of 575 seeds from (*a*) naturally diseased plants and (*b*) pods inoculated through the pedicel, plated on nutrient dextrose agar, only two yielded the bacterium, which was also obtained from eight out of 100 aborted seeds from inoculated pods. These data [cf. ibid., 31, p. 95] are interpreted as confirmatory of field observations that epiphytotics in the crop often arise from a very few initially infected seedlings in the seed-bed under conditions promoting secondary dissemination. Bioassay of seed lots for *X. campestris* by plating is very unreliable.

Thirty-second Report of the National Institute of Agricultural Botany, 1951.—42 pp., [? 1952].

In the mycology section (pp. 13 and 14) of this report from Cambridge [cf. *R.A.M.*, 29, p. 551] it is stated that from 80 samples of wheat yellow rust [*Puccinia glumarum*: ibid., 31, p. 598] collected in Great Britain in 1951 races 2, 3, 5, 6, and

8 were differentiated. Many of the 52 varieties on which it was detected gave reduced yields as a result. Of the wheat varieties inoculated in 1950 with a spore suspension of the loose smut fungus [*Ustilago tritici*] by hypodermic injection into each spikelet of the ear, Bersee, Scandia, Scandia II, Scandia III, Jubilegem, Franc Nord, Desprez 80, Rampton Rivet, Yeoman, and Pilot remained free from infection. In 1951 a new infection technique was developed in which the ears are enclosed in a glass cylinder with a spore suspension, the air being then evacuated.

On p. 26 it is stated that the marked reduction in the percentage of celery samples affected with *Septoria apii-graveolentis* continued in 1951, over 48 per cent. of the 229 samples tested having less than 5 per cent. infection. A reduction was also observed in bunt (*Tilletia caries*) in commercial wheat samples, compared with 1924–30 surveys.

Blattný [C.]. **Poznámky z ochrany rostlin.** [Notes on plant protection.]—*Ochr. Rost.* [*Plant Prot., Prague*], 23, 3, pp. 267–269, 1950.

Apple mildew (*Podosphaera leucotricha*) [C.M.I. map No. 118; *R.A.M.*, 10, p. 247] was widespread and troublesome in Czechoslovakia in 1950. A pre-blossom spray with 3 per cent. barium polysulphide (polybarium, solbar) gave excellent protection. In trials for the control of apple and pear scab (*Venturia inaequalis* and *V. pirina*) [ibid., 17, p. 478; C.M.I. map No. 120] at Dobra Voda zinc sulphate (½ kg.) and slaked lime (1 kg.) in 100 l. water gave very good results on the Žlutý Richard, Herbertova, and Zlatá Parména varieties, though further tests are necessary. *Brevicoryne brassicae* was serious as a vector of cauliflower mosaic virus [*R.A.M.*, 28, p. 262].

Foster (W. R.) & MacSwan (I. C.). **Report of Plant Pathology Branch.**—*Rep. B.C. Dep. Agric., 1951*, pp. Y49–Y53, 1952.

In this report [cf. *R.A.M.*, 31, p. 103] it is stated that exceptionally dry weather prevailed in British Columbia during most of the 1951 growing season, and physiological disorders were unusually prevalent. There was no apparent change in the situation of little cherry disease [ibid., 31, p. 54]. Further evidence was obtained that for the application of fungicides in the control of apple scab [*Venturia inaequalis*: ibid., 32, p. 62] the Turbo Mist concentrate sprayer was as effective as the conventional gun sprayers and as it requires less time and labour it considerably reduces costs. Lime-sulphur at 10 gals. per 100 gals. water for the pink and calyx stages and at 8–100 for the three cover sprays gave good control in the worst area (West Kootenays and Arrow Lakes), and better results than 15 lb. wettable sulphur plus 5 lb. ferbam per 100 gals. In the less badly affected Creston district lime-sulphur gave better control on the foliage than wettable sulphur plus ferbam, but the reverse was true of the fruit. The three-year average increase in annual acre yield from the wettable sulphur plus ferbam plots over lime-sulphur was 205 boxes of McIntosh and 145 of Delicious, also leaves sprayed with the former fungicide were greener.

Fireblight of pears [*Erwinia amylovora*: loc. cit.] was moderately widespread in the Okanagan; the preliminary evidence indicates that blossom sprays with Bordeaux and dithane Z 78 offer some promise and that ferbam is less effective. In the Creston area *Coryneum* blight [*Clasterosporium carpophilum*: ibid., 29, p. 349] is often serious in peach orchards not given the recommended spray programme. The Fisher variety has shown marked resistance. The campaign for the eradication of plum black knot [*Dibotryon morbosum*: loc. cit.] has been continued. The increasing use of certified strawberry plants has been important in restricting the spread of red stele [*Phytophthora fragariae*: ibid., 31, p. 103]. During 1951, 4,895,000 plants were certified [ibid., 28, p. 444], compared with about 2,000,000 in 1950.

Boskoop Giant black currants were sprayed against blister rust [*Cronartium ribicola*: ibid., 30, pp. 15, 508] at the rate of 2 gals. per bush, all the plots, including the control, receiving lime-sulphur (1 in 10) in the dormant stage on 15th April; at cluster-bud on 3rd May and calyx stage on 30th May one plot received wettable sulphur (6 in 100), a second ferbam (2 in 100), a third lime-sulphur (2·5 in 100), and one no treatment. On 20th September the four plots had, respectively, 13, 30, 56, and 73 per cent. heavy infection, with (for the first three, respectively) 50, 30, and 25 per cent. freedom from infection. In two years' trials wettable sulphur has been more effective than ferbam or lime-sulphur. An additional application shortly after harvest appears to be required. Crusader and Coronet [loc. cit.] are both susceptible to powdery mildew [*Sphaerotheca mors-uvae*: cf. ibid., 28, p. 21].

A blueberry [*Vaccinium*] survey made in the Fraser Valley during the growing season indicated that the Pemberton and Atlantic varieties are very susceptible to cane blight (*Godronia cassandrae*) [ibid., 24, p. 5], which together with cane gall (probably caused by *Agrobacterium* [*Bacterium*] *rubi*) [cf. ibid., 30, p. 209; but see 32, p. 25] appears to be confined to recently introduced varieties; Grover, Pioneer, Rancocas, and Rubel seem to be relatively unaffected by both disorders.

British Columbia continues to remain virtually free from bacterial ring rot of potato [*Corynebacterium sepedonicum*: ibid., 31, p. 103]. The crops of two growers in the Fraser Valley were detained because of small amounts of infection, three in the Kamloops area, and one at Houston. The ten farms with affected crops in 1950 and four others which used some of the same machinery were free from infection. Two carloads of commercial potatoes from Alberta and one from Ontario were infected.

Tomato *Verticillium* wilt [*V. albo-atrum*: ibid., 27, p. 354] is widespread and causes considerable losses in the field and sometimes in greenhouses.

Diseases new to British Columbia included garlic white rot (*Sclerotium cepivorum*) [cf. ibid., 27, p. 549], maize bacterial wilt (*Xanthomonas stewarti*) [C.M.I. map No. 41], found in two growers' crops near Victoria, carnation blindness due to boron deficiency [cf. *R.A.M.*, 20, p. 205], and crown and root rot of Lawson's cypress (*Chamaecyparis lawsoniana*), caused by an unidentified species of *Phytophthora* [cf. ibid., 31, p. 152].

Plant disease survey for the twelve months ending 30th June, 1951. Twenty-first Annual Report N.S.W. Department of Agriculture. Biological Branch—Division of Science Services.—54 pp., 1 map, [? 1952. Mimeographed.]

This annual disease survey for New South Wales [cf. *R.A.M.*, 30, p. 558] was compiled with the help of the Colonial Sugar Refining Company, Ltd. (for sugar-cane diseases), the Department of Agriculture, University of Sydney, and the Commonwealth Scientific and Industrial Research Organization. Some of the records have already been noticed from other sources [ibid., 31, pp. 104, 225].

The sugar-cane losses due to disease were estimated at 0·09 per cent. of the total crushed (359,849 tons), being 321 tons for Fiji disease [cf. ibid., 30, p. 558], 3 tons for mosaic [cf. ibid., 2, p. 581], and 4 tons for red stripe (*Xanthomonas rubrilineans*) [C.M.I. map No. 39], the loss from the last having declined from 15 tons in 1949–50 and 35 tons in 1948–9.

Considerable infection of lucerne by witches' broom virus [*R.A.M.*, 31, p. 125] occurred in the Riverina and Western Division, where the disease has become, in many instances, a limiting factor in the useful life of the stands.

At the Yanco Experiment Farm a small percentage of the sunflower plants showed symptoms of [tomato] big bud virus [loc. cit.; cf. ibid., 27, p. 500; 31, p. 225]. Asters at Springwood (Central Tableland) and in several Metropolitan localities were also affected by the same virus [ibid., 22, p. 457], which was much less prevalent than in the two previous seasons, but in one crop at Berowra

(Metropolitan Area) one-third of a crop of 10,000 plants was lost in February. The virus was also reported on *Bouvardia* for the first time in New South Wales, at Kotara (Central Coast), on *Phlox divaricata* in the Metropolitan Area, Shasta daisy [*Chrysanthemum maximum*] in the Coast and Tableland localities, and peas at Yanco in the Murrumbidgee Irrigation Area.

Tobacco bacterial wilt (*Bacterium* [*Pseudomonas*] *solanacearum* [ibid., 19, p. 69], apparently favoured by seasonal conditions, was present in all crops inspected, causing considerable losses up to about 50 per cent. Root rot (*Armillaria mellea*) continues to be a major cause of citrus losses [ibid., 26, p. 337] in the Mangrove Mountains, Somersby, Kulnura, the Maroota district, and on the lighter soils of the Hawkesbury River flats. The practice of allowing main crop lemons to ripen on the trees because of low prices has had a disastrous effect on infected trees.

Heavy infection of pears by *Fabraea maculata* [cf. ibid., 12, p. 231] occurred in a nursery at Narara; the Winter variety displayed considerable resistance. The fungus also caused severe infection of quince trees [cf. ibid., 3, p. 521] in all parts of the State; trees were defoliated by midsummer, and often the new growth was so severely infected that a second premature defoliation followed. The disease was recorded for the first time in the Murrumbidgee Irrigation Area, where premature defoliation was also serious. Trees in nurseries in the Metropolitan Area were heavily attacked, but one nurseryman is using an apparently immune strain of quince. Banana bunchy top virus [ibid., 29, p. 629] continued to decrease, none being found in the Clarence and Yarrahappini areas (North Coast). During the year 3,831 diseased plants were found and destroyed, as compared with 5,385 the year before. The percentage of bunchy top in the State banana-growing area of 26,198 acres was 0·15.

Varietal differences in the susceptibility of *Camellia* to root rot (*Phytophthora cinnamomi*) [cf. ibid., 31, p. 541] were conspicuous; *C. sasanqua* [ibid., 30, p. 452] varieties displayed good field resistance, while *C. fimbriata alba*, *C. otome*, and *C. triumphans* were very susceptible. *Cupressus* canker and twig blight (*Monochaetia unicornis*) [ibid., 31, p. 225; cf. 32, p. 64] caused much damage, especially to *C. sempervirens* in the Metropolitan Area. Oleander bacterial gall (*Pseudomonas savastanoi* [var. *nerii*: cf. ibid., 3, p. 181; 13, p. 748]) was recorded from a Metropolitan garden.

A total of 373 acres (91 crops) of beans [*Phaseolus vulgaris*] was inspected and 192 acres (51 crops) were passed for certification [ibid., 28, p. 151]. The total yield of certified seed is estimated at about 2,700 bush., of which about 47 per cent. is expected to be Brown Beauty. Hawkesbury Wonder, Tweed Wonder, Windsor Longpod, and Canadian Wonder were also certified. Only one seed crop (Canadian Wonder) on the South Coast was rejected during the season on account of halo blight (*Pseudomonas* [*medicaginis* f.sp.] *phaseolicola*) [ibid., 29, p. 288; 31, p. 3]. This was the first season since the establishment of the scheme when no seed crop of Brown Beauty, Tweed Wonder, or Wellington Wonder was affected. Throughout the year halo blight was detected in only two crops in the Gosford area, one of Tweed Wonder, the other of Wellington Wonder. Anthracnose (*Colletotrichum lindemuthianum*) [ibid., 28, p. 151; 31, p. 3] was again responsible for more crop rejections (21 of the 40 crops rejected) than any other single cause. In the spring of 1950 it was found in three crops of Tweed Wonder in the Gosford district. A strain of the fungus different from that commonly found in New South Wales appears to be responsible, glasshouse inoculations demonstrating that it can attack Tweed Wonder, Wellington Wonder, and certain Brown Beauty selections, all of which resist the common strain. Progress was made in building up lines of Brown Beauty completely resistant to the common strain.

At Coonabarabran all plants of several tomato varieties were infected by bacterial spot [*X. vesicatoria*: ibid., 28, p. 199] in spite of hot water seed treatment (30 minutes

at 50° C.) followed by a panogen soak (3 hours, 1 in 1,000). On the other hand, plants grown at the Botanic Gardens, Sydney, from seed derived from severely spotted fruits developed no infection.

MEHTA (P. R.). **Observations on new and known diseases of crop plants of the Uttar Pradesh.**—*Plant Prot. Bull., New Delhi*, 3, 2, pp. 7–12, 1951. [Received 1952.]

The following items occur in this review of the disease situation in Uttar Pradesh [cf. *R.A.M.*, 32, p. 103] during the 1950 season. Til [sesame] anthracnose (*Colletotrichum* sp.) [cf. ibid., 6, p. 715] affected 10 to 12 per cent. of the early-sown plants at the Research Farm, Kanpur, whereas on the late-sown crop the disease was negligible. Oval or elliptical, water-soaked lesions on the stem or leaf axis are characteristic of this disease. As the spots do not encircle the stem completely, longitudinal streaks of dead tissue are formed, sometimes running the whole length of the stem and involving the fruiting branches. Other diseases observed on sesame were powdery mildew (*Oidium* sp.) [loc. cit.], stem rot (*Macrophomina phaseoli*) [ibid., 24, p. 503], and phyllody [ibid., 28, p. 6]. Groundnuts were attacked by anthracnose (*C.* sp.) [ibid., 6, p. 57], stem rot (*M. phaseoli*) [ibid., 21, p. 363], and tikka disease (*Cercospora personata*) [ibid., 28, p. 134]. Three sprays of Bordeaux mixture or three dustings with sulphur gave the best control of *C. personata* resulting in a 50 per cent. average yield increase over the untreated. Jowar [sorghum] grain smut (*Sphacelotheca sorghi*) [ibid., 31, p. 594 and below, p. 177] was most effectively controlled by agrosan GN, ceresan giving the next best results. Of 20 varieties tested only 31B and 4101 were smut resistant. Pomegranate fruit rot was reported in July from the Bulandshahr district. The disease started from the calyx end and gradually spread over the entire fruit. Pycnidia of a species of *Phomopsis* were found on the affected areas and on leaf lesions. One spray of perenox (with albolinium as a sticker) checked the secondary infection. Guava anthracnose (*Colletotrichum psidii*) [ibid., 7, p. 744] caused serious damage in the Agra district during the August rains. There is some evidence that the disease persists on mummified fruits. Fig zonate spot (*Cephalosporium fici*) [ibid., 28, p. 180] was found on leaves of *Ficus carica*.

VASUDEVA (R. S.). **Incidence of important diseases in some of the important economic crops at the Indian Agricultural Institute and its sub-station at Karnal during 1950-51.**—*Plant Prot. Bull., New Delhi*, 3, 4, pp. 112–115, 1951. [Received October, 1952.]

A list is given of some major crop diseases observed at the Indian Agricultural Research Institute, New Delhi, and its substation at Karnal [see below, p. 179] during the 1950–1 survey. Disease incidence on the whole was very light, causing only slight infections in most crops. Bordeaux mixture sprays gave good control of maize downy mildew (*Sclerospora philippinensis*) [*R.A.M.*, 29, p. 360] at the Institute Farm.

GOVINDA RAO (P.). **Control of plant diseases in the northern region of the Madras State in the year 1949-50.**—*Plant Prot. Bull., New Delhi*, 3, 1, pp. 21–22, 1951. [Received 1952.]

Piricularia oryzae [*R.A.M.*, 32, pp. 34, 103 and next abstract] is reported to be responsible for appreciable damage in rice nurseries in certain years in the North Visakhapathanam, Nellore, and Chittoor districts of Madras. A Rice Research Station was, therefore, started in Nellore with a view to developing new blast resistant varieties, and selections B.C.P.1 and B.C.P.2 from the local suspectible varieties were distributed. *Setaria italica* smut (*Ustilago crameri*) [loc. cit.; C.M.I.

map No. 239] is confined mainly to Bellary and Anatapur districts. *S. italica* seeds treated with sulphur were sown in an area of 16,300 acres with a resultant increase in yield of 82 tons of grain. Two Bordeaux mixture (1 per cent.) sprays were effective against turmeric leaf spot (*Colletotrichum capsici*) [*R.A.M.*, 11, p. 545 and next abstract] over an area of 621 acres. Tobacco damping-off (*Pythium aphanidermatum*) [ibid., 17, p. 295] occurs every year in the northern region of Madras and some 500 acres of nurseries were sprayed with Bordeaux mixture against it. Citrus mottle leaf [? zinc deficiency: see next abstract] is quite common in all sweet orange gardens. Zinc sulphate-lime sprays gave effective control on 970 acres, resulting in an estimated saving of 485 tons of fruit. An epidemic of citrus felt disease (*Septobasidium* [*pseudopedicellatum*: ibid., 31, p. 182]) occurred in the West Godavari district.

Plant protection work in Madras State during the quarter ending 31st March, 1951. —*Plant Prot. Bull., New Delhi*, 3, 4, pp. 95–101, 1951. [Received October, 1952.]

During the season 488 acres of rice in six districts of Madras were treated with Bordeaux mixture or perenox against blast [*Piricularia oryzae*: see preceding abstract and below, p. 206]; seed for 6,753 acres was treated with agrosan GN against foot rot (*Fusarium moniliforme* [*Gibberella fujikuroi*: *R.A.M.*, 31, p. 629; 32, p. 37] and *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: ibid., 32, p. 34]). Enough sulphur was sold to farmers to treat sorghum seed for 26,868 acres against grain smut (*Sphacelotheca sorghi*) [see above, p. 176, and below, p. 179], and Italian millet (*Setaria italica*) seed for 750 acres against smut (*Ustilago crameri*) [see preceding abstract]. Selection and treatment of sugar-cane setts against red rot (*Colletotrichum falcatum*) [*Physalospora tucumanensis*: ibid., 31, p. 539] were demonstrated in an area of over 98 acres. Zinc sulphate and lime mixture was applied to 34,494 citrus trees for protection against foliocellosis [zinc deficiency: see preceding abstract and below, p. 184], while 1,231 acres of chilli were sprayed with copper fungicides for the control of fruit rot (*Colletotrichum capsici*) [ibid., 27, p. 464 and preceding abstract].

Better farm crops.—*Crops & Soils*, 3, 8, pp. 28–29, 1951. [Received January, 1953.]

Burley 1, a new tobacco variety resistant to black root rot [*Thielaviopsis basicola*: *R.A.M.*, 30, p. 435] is reported by G. E. McVicker from the Tennessee Agricultural Experiment Station.

The new oat variety, Mo.-0-205 [ibid., 32, p. 16], developed from a cross between Columbia and 0–200, is reported from the Missouri Agricultural Experiment Station to be the only variety combining both adaptability to local conditions and resistance to Victoria blight [*Helminthosporium victoriae*: ibid., 32, p. 76] and race 45 of crown rust [*Puccinia coronata*: ibid., 32, p. 75].

Better farm crops.—*Crops & Soils*, 3, 9, pp. 28–29, 1 fig., 1951. [Received January, 1953.]

Rowan, a new variety of Korean lespedeza released by the North Carolina Agricultural Experiment Station and developed in co-operation with the United States Department of Agriculture, is resistant to powdery mildew [*Microsphaera diffusa*: cf. *R.A.M.*, 30, p. 522].

The new maize hybrid Colorado 330 developed at the Colorado A & M College Experiment Station has been outyielding Colorado 332 and Ohio C-12 by about 10 per cent., being more resistant to smut [*Ustilago maydis*: ibid., 29, pp. 291, 372; 32, p. 72].

Ohio C54, a new early maize hybrid tested at the Virginia Agricultural Experiment Station, yields well and is resistant to southern leaf blight (*Helminthosporium maydis*) [*Cochliobolus heterostrophus*: ibid., 30, p. 224], northern leaf blight (*H. turcicum*) [see below, p. 182], and stalk rot [unspecified: cf. ibid., 32, p. 72]. It is being recommended for early main crops west of the Blue Ridge Mountains.

The new mid-season potato variety Cherokee, developed by the United States Department of Agriculture in co-operation with the Indiana and Iowa Agricultural Experiment Stations, is highly resistant to late blight [*Phytophthora infestans*: see below, p. 207] and scab [*Actinomyces scabies*: loc. cit.]. In Iowa tests it gave a three-year average of 566 bush. of No. 1 tubers per acre compared with 461 bush. for Cobbler. Cherokee was selected from a cross made at the Plant Industry Station, Beltsville, Maryland, in 1940, and is being increased for general distribution.

Waggoner (P. E.) & Dimond (A. E.). **Crown gall suppression by ionizing radiation.** —*Amer. J. Bot.*, 39, 9, pp. 679–684, 1 graph, 1952.

At the Department of Plant Pathology, Connecticut Agricultural Experiment Station, New Haven, the formation of galls by *Agrobacterium* [*Bacterium*] *tumefaciens* strain A-6 on Bonny Best tomato, *Nicotiana glutinosa*, and *Kalanchoe daigremontiana* was suppressed when the hosts were exposed to 30,000 r. gamma irradiation (Abs. in *Phytopathology*, 41, pp. 10–11, 1951) either immediately after inoculation or five days later. Galls already on tomato were suppressed by X-rays at 4,000 r. or above immediately before inoculation, while gall inception was usually delayed a few days by doses of 4,000 to 5,000 r. just before or just after inoculation, and 6,000 r. and above delayed it for three weeks or more. Only 63 per cent. of the bacteria *in vitro* were inactivated by about 3,000 r. Single colony isolates from bacteria exposed *in vitro* to 10,000 r. were all pathogenic, as were those from suppressed galls.

The above results suggest that irradiation is affecting the host tissue directly and not the pathogen itself. Galls are suppressed as readily on plants inoculated at three or four days intervals following irradiation as on those inoculated only once immediately afterwards. Galls present on plants at the time of radiation can also be suppressed. The temporary suspension of gall formation by low doses and the extended or indefinitely long delay produced by high doses may be due to suppression of auxin production [*R.A.M.*, 31, p. 376].

Pichler (F.) & Schreier (O.). **Wichtige Krankheiten und Schädlinge im Getreidebau.** [Important diseases and pests in cereal culture.]—62 pp., 29 col. figs., Vienna, Bundesanstalt für Pflanzenschutz, 1952.

This semi-popular booklet deals with the occurrence, recognition, importance, and control of some fungal diseases of cereals in Austria, with observations on the life-histories of the pathogens concerned.

Hopf (P. P.), Lhoste (J.), & Ravault (L[ucienne]). **A new mercurial with apparent systemic properties as a seed dressing.**—*J. Sci. Food Agric.*, 2, 7, pp. 295–302, 3 figs., 1951.

The results of experiments undertaken jointly by Ward, Blenkinsop & Co. Ltd, 6 Henrietta Place, London, W. 1, and the Laboratoire de Recherche Agronomique, Société des Matières Colorantes et Produits Chimiques de St. Denis, Paris, on the use of phenyl mercuric dinaphthylmethane disulphonate (fixtan) [*R.A.M.*, 30, p. 623] as a wet or dry cereal seed dressing are reported, tabulated, and discussed. *Fusarium culmorum*, *Ustilago zeae* [*U. maydis*], and *Tilletia caries* were used in the laboratory trials, and the last-named (on Bon Fermier wheat) also in the field.

The compound was shown to be highly effective as a fungicide, without adverse effects on germination even at high concentrations or after storage, and very much less toxic to guinea-pigs than would be expected of a mercurial. In the same trials methyl mercuric dicyandiamide exerted an effect similar to that of fixtan on mycelial growth of *F. culmorum* and spore germination of *U. maydis* and *T. caries*; its vapour also is toxic.

Vasudeva (R. S.). **Incidence of important diseases in some of the important economic crops at the I.A.R.I. and its sub-station at Karnal during 1949-50.**—*Plant Prot. Bull., New Delhi*, 3, 1, pp. 13–15, 1951. [Received 1952.]

This is a brief review of the major crop diseases observed during the 1949–50 disease survey at the Indian Agricultural Research Institute Farm, New Delhi, and its substation at Karnal. At the latter the wheat varieties N.P.165, N.P.710, and C.228 were all free from flag smut (*Urocystis tritici*) [*R.A.M.*, 30, p. 604; 31, p. 428] and N.P.4, N.P.80–5, N.P.165, and C.228 from yellow rust [*Puccinia glumarum*: loc. cit.; ibid., 31, p. 540, and next abstract], which was prevalent on other varieties. N.P.165 remained free from yellow rust at Delhi also and N.P.775, N.P.760, N.P.720, C.591, and C.228 showed only traces. Only traces of wheat black rust [*P. graminis*: loc. cit.; ibid., 31, p. 594] occurred on N.P.710, N.P.758, N.P.764, and N.P.775 at Delhi, and on N.P. 710, N.P. 715, N.P. 758, N.P. 760, and C. 591 at Karnal. Luthra's solar heat treatment [ibid., 29, p. 555] reduced sorghum grain smut (*Sphacelotheca sorghi*) [see above, pp. 176, 177] from 12·5 to 0·5 per cent. infection. In field seed treatment experiments on maize [cf. ibid., 31, p. 540] barbak, copper carbonate, semenon, and aagrano gave significant increases in stand over the controls; on wheat agrosan GN, spergon, semenon, ceresan, barbak, aagrano, mersolite D, and mersolite P increased the percentage germination to 90, 92, 97, 86, 89, 88, 80, and 83, respectively, as against 78 for the untreated.

The reaction of the various Wheat varieties against rust during 1949-50.—*Plant Prot. Bull., New Delhi*, 3, 1, pp. 16–17, 1951. [Received 1952.]

The reaction of various wheat varieties to black, brown, and yellow rusts [*Puccinia graminis*, *P. triticina*, and *P. glumarum*: see preceding and next abstracts] during the 1949–50 season in different parts of India is briefly described. Ford was comparatively resistant in Kashmir to all these rusts; the varieties 319 and 166 were partially resistant to *P. triticina* in Bihar; Popatia, in Bombay, was also resistant to *P. triticina*; Samba, in Madras, was resistant to *P. graminis* but susceptible to *P. triticina* and *P. glumarum*; and C. 282 and C. 281 were highly resistant to *P. graminis* in the Punjab.

Gokhale (V. P.), Chowdhary (B. B.), Patel (M. K.), & Chavan (V. M.). **Breeding rust resistant varieties of Wheat for Bombay State.**—*Poona agric. Coll. Mag.*, 41, 3, pp. 197–205, 1950. [Abs. in *Biol. Abstr.*, 25, 12, p. 3358, 1951.]

Of the races 15, 21, 24, 34, 40, 42, 42A, 42B, 75, new race A, and new race B of stem rust [*Puccinia graminis*: *R.A.M.*, 29, p. 553 and preceding abstracts] encountered in Bombay State, races 15, 21, 40, and 42 were the most common. Of the exotic wheat varieties, Kenya E.144, Hofed 1, Kenya C.10854, Charter, Gabo, Dowerin, and Gaza were resistant to races of the rust occurring in Peninsular India. Gaza was quite promising for dry areas. Selections from Kenya E.144 × Niphad 4, Hofed 1 × Niphad 4, and Mondhya 417–5 × Hofed 1 have proved promising and are being multiplied for general distribution.

Bayles (B. B.) & Rodenhiser (H. A.). **New stem rust threatens Wheat crops.**—*Crops & Soils*, 3, 8, pp. 25–26, 1951. [Received January, 1953.]

It is reported that in 1950 the loss of durum wheat due to race 15B of stem rust

[*Puccinia graminis*: *R.A.M.*, 31, p. 482] was estimated at 35 per cent. in Minnesota and 22 per cent. in North Dakota, totalling more than 10,000,000 bush.

GATTANI (M. L.). **Adaptation of fungi to fungicides and its significance in agriculture.** —*Indian Phytopath.*, 4, 2, pp. 174–180, 1951. [Received 1952.]

In the Plant Pathology section, Department of Agriculture, Bharatpur, India, an *Alternaria* sp. isolated from wheat seeds became adapted to higher concentrations of agrosan GN and arasan incorporated in potato dextrose agar after successive transfers to increasing concentrations. However, the line adapted to one fungicide behaved as if it were unadapted when transferred to the other series. In view of these findings it is suggested that fungicides used in disease control should be alternated to avoid the possibility of their becoming ineffective after continuous use.

AKAI (S.). **Relation of temperature to the invasion of the Barley powdery mildew into the host.**—*Agric. & Hort., Tokyo*, 27, 10, p. 1135, 1952. [Japanese.]

Inoculation tests on barley seedlings with conidial suspensions showed that the optimum temperature for the penetration of the powdery mildew fungus [*Erysiphe graminis*] into the host is about 20° C. [cf. *R.A.M.*, 30, p. 605]. There was considerable infection at 10° but very little at 30°. At 10° to 15° the longer the water containing the spores remained on the leaf, the more infection developed, but at 20° it decreased when the drops of inoculum were maintained for more than six hours. At 30° the application of the suspensions for periods exceeding two hours resulted in a decline of infection, and hardly any occurred on plants kept in the infection chamber for 24 hours.

Two grain varieties released by New York are disease resistant.—*Crops & Soils*, 3, 8, p. 30, 1951. [Received January, 1953.]

A new barley variety, Erie, resistant to race 4 of powdery mildew [*Erysiphe graminis*: *R.A.M.*, 31, p. 279] and semi-resistant to loose smut [*Ustilago nuda* and *U. nigra*: ibid., 29, p. 359; 32, p. 16], also a new wheat variety, Genessee, resistant to loose smut [*U. tritici*: ibid., 31, p. 546] and moderately resistant to bunt [*Tilletia caries* and *T. foetida*: loc. cit.; ibid., 32, p. 15], have been developed by Cornell University Agricultural Experiment Station in co-operation with the United States Department of Agriculture. In yield trials Erie gave an average of 3 bush. per acre more than Alpha, and Genessee about 8 per cent. more than Cornell 595 and Yorkwing.

ZOGG (H.). **Studien über die Pathogenität von Erregergemischen bei Getreidefusskrankheiten.** [Studies on the pathogenicity of combinations of pathogens in cereal foot rots.]—*Phytopath. Z.*, 18, 1, pp. 1–54, 7 figs., 13 graphs, 1951. [English summary. Received April, 1952.]

In this amplified, fully tabulated account of the author's studies at the Federal Agricultural Experiment Station, Zürich-Oerlikon, Switzerland, on the role of combined fungal infections in the development of cereal foot rots [*R.A.M.*, 31, p. 57] the author arrives at the following conclusions. Combinations of two, three, or four parasites may cause very complicated results [loc. cit.]. When mixed cultures of the fungi having 'indifferent' and 'depressing' effects on host infection were used, the reaction time of the host for reaching a stable state of infection was shortened and was sometimes changed in type. No appreciable difference was discernible between inoculations made with components simultaneously or one several days after the other. The time during which one parasite exerts its influence on another, as well as temperature, play an important role in determining the type

of host reaction, especially when infection is depressed. The host itself may cause a change in the type of reaction, especially if the partners in a combined infection attack the hosts with different degrees of severity.

Diagnoses of three new species described by E. Müller *in litt.* are also given, namely, *Diplodina speltae*, *Coniothyrium cerealis*, and *Phoma rhaetica*, all collected on dead haulms in the canton of Zürich. In inoculation experiments on young wheat plants *D. speltae* and *C. cerealis* were strongly and *P. rhaetica* weakly pathogenic.

D. speltae, isolated from spelt wheat, is characterized by subepidermal, globose, compressed, or irregularly shaped pycnidia, 50 to 90 μ in diameter; a conical or hemispherical ostiole rupturing the epidermis; and short (or absent), hyaline conidiophores bearing cylindrical, sometimes slightly curved, uniseptate, hyaline to faintly olive-coloured conidia, 5 to 8 by 2 μ.

The hemispherical or scutiform, subepidermal pycnidia of *C. cerealis*, measuring 150 to 250 μ in diameter and furnished with an apical pore 10 μ in width, are scattered over the substratum singly or in groups of two or three; the rod-shaped, unicellular, pale yellowish conidia (yellow-brown in the mass), 4 to 6 by 1 μ, are borne on hyaline, filiform conidiophores, 13 to 15 μ in length. This species and *P. rhaetica* occur on wheat, barley, and rye.

The subepidermal, globose pycnidia of *P. rhaetica*, measuring 100 to 130 μ in diameter, are provided with a flat to more or less hemispherical pore; the simple, filiform, hyaline conidiophores, 3 to 7 μ in length, give rise to rod-shaped or oblong, hyaline, often guttulate conidia, 6 to 11 by 2 to 3 μ.

Bakshi (B. K.). **Seedling blight and foot rot of cereals caused by Fusarium avenaceum (Fr.) Sacc. and Fusarium culmorum (W. G. Sm.) Sacc.**—*Indian Phytopath.*, 4, 2, pp. 162–169, 1 graph, 1951. [Received 1952.]

In spring, 1947, barley plants growing near Edinburgh, Scotland, were affected by pre-emergence and seedling blight, the bases constantly yielding *Fusarium avenaceum* [*R.A.M.*, 29, p. 15] and *F. culmorum* [ibid., 29, pp. 291, 499]. Pathogenicity experiments in the greenhouse on six barley and three wheat varieties in inoculated sterile sand and with barley only in unsterilized soil showed *F. culmorum* to be a weak pathogen and *F. avenaceum* a strong one as determined by the effect on emergence and seedling infection. The barley reactions, in order of increasing susceptibility to *F. avenaceum*, were Spratt-Archer, Pioneer, Plumage-Archer, Abed Maja, and Rigel, and the wheat, Squareheads Master, Yeoman, and Holdfast. Incidence was low in acid soils (pH 4·5 to 5) but increased as the pH rose. Infection may be reduced considerably, therefore, without affecting yield, by maintaining the soil pH at 6 to 7.

Deufel (J.). **Die Züchtung von Mutterkorn (Claviceps purpurea) auf tetraploidem Roggen. Der Alkaloidgehalt von auf tetraploidem Roggen gewachsenen Mutterkornsklerotien.** [The culture of ergot (*Claviceps purpurea*) on tetraploid Rye. The alkaloid content of ergot sclerotia grown on tetraploid Rye.]—*Naturwissenschaften*, 39, 18, pp. 432–433, 1 fig., 1952.

At the Technical College, Karlsruhe, Germany, the culture of *Claviceps purpurea* on Petkus tetraploid rye resulted in increases in sclerotial size and of up to 20 per cent. in yield as compared with the quantities produced on diploid plants [*R.A.M.*, 32, p. 124]. On both artificially and naturally infected crops the 100-sclerotia weights from diploid and tetraploid plants were 8,226 and 24,516 gm., respectively, with isolated fivefold increases, the corresponding total alkaloid contents, determined photometrically, being 0·028 and 0·035 per cent. for sclerotial weights of 1·89 and 5·63 mg., respectively.

As already observed for diploid rye by Mothes and Silber (*Pharmazie*, 7, p. 310, 1952), *C. purpurea* produces the heaviest sclerotial yields on tetraploid plants in proximity to infected *Holcus*, *Poa*, and *Festuca* spp. [*R.A.M.*, 29, p. 567].

Miller (J. H.). **The presence of internal mycelium in Corn grains in relation to external symptoms of Corn ear rot.**—Abs. in *Phytopathology*, 42, 5, p. 286, 1952.

In previous surveys of maize ear rots in Georgia the predominant fungus was *Fusarium moniliforme* [*Gibberella fujikuroi*: cf. *R.A.M.*, 24, p. 225; 29, p. 556], which accounted for 95 per cent. of the total, the remainder consisting of *Diplodia zeae* (3 per cent.), *G. zeae* (1 per cent.), and species of *Penicillium*, *Aspergillus*, and *Rhizopus* (1 per cent.). Surface-sterilized grains from ears rated as free from infection uniformly gave rise in culture to *G. fujikuroi*, but not to any of the other species.

In a recent similar investigation of ears from breeding stocks, 64·4 per cent. yielded *D. zeae*, 12·2 per cent. *D. frumenti* [ibid., 17, p. 670], 9·6 per cent. *D. macrospora* [loc. cit.], 9·6 per cent. *G. fujikuroi*, and 3 per cent. *Helminthosporium carbonum* [ibid., 30, pp. 226, 463]. Some of the ears showed no external symptoms, while others were definitely rotted. The mycelium of *D. zeae*, the principal pathogen which is present even in apparently sound grains, appeared to grow from the cob through the grain attachment, some of it filling the cavities between the embryo and the scutellum, the coleoptile and the plumule, and immediately beneath the coleorhiza [cf. ibid., 31, p. 487]. The embryonic tissues were the first to be invaded, the endosperm and pericarp disintegrating only in the most advanced stages. Comparable symptoms were induced by *D. macrospora*. Infection by *D. frumenti* and *H. carbonum* was followed immediately by perceptible symptoms and all the tissues seemed equally susceptible.

Duffield (P. C.). **Combination insecticide-fungicide seed treatments for Corn.**—*J. econ. Ent.*, 45, 4, pp. 672–674, 1952.

In field trials at the Iowa Agricultural Experiment Station lindane was the most injurious of four insecticides applied to maize grains and methoxychlor the least, dieldrin and aldrin being intermediate in their effects. The seed thus damaged was more susceptible than untreated lots to infection by soil pathogens, including *Pythium* sp. In a laboratory experiment this fungus grew freely on water agar around seed treated with an aldrin emulsifiable concentrate plus arasan. On the other hand, an uninvaded zone was left round those treated with arasan alone or in combination with aldrin wettable powder. The lindane treatment also increased [unspecified] mould development on the seed. It is recommended, on the basis of the experimental data, that insecticidal treatments be made shortly before planting and combined with the incorporation of a suitable fungicide [cf. *R.A.M.*, 24, p. 328].

Jenkins (Merle T.), Robert (Alice L.), & Findley (W. R.). **Inheritance of resistance to Helminthosporium turcicum leaf blight in populations of F_3 progenies.**—*Agron. J.*, 44, 8, pp. 438–442, 2 graphs, 1952.

Further data on the inheritance of resistance in maize to leaf blight (*Helminthosporium turcicum*), based on studies of 12 populations of F_3 progenies, are presented from the Division of Cereal Crops and Diseases, Plant Industry Station, Beltsville, Maryland [*R.A.M.*, 31, p. 550]. Seven of the progeny groups were tested in 1949 and five in 1950. All the plants were inoculated to produce a severe epiphytotic of the disease and rated for infection in August and September.

Many genes were found to be responsible for resistance, but the effects of some are more potent than those of others. Some of these major genes operate, or produce the most conspicuous effects, at low and others at high levels of disease incidence, while the influence of a further complement is exerted over a wide range.

Goodman (J. J.) & Christensen (C. M.). **Grain storage studies XI. Lipolytic activity of fungi isolated from stored Corn.**—*Cereal Chem.*, 29, 4, pp. 299–308, 1952.

At the Minnesota Agricultural Experiment Station single cultures of *Penicillium solitum*, *Aspergillus flavus*, *A. candidus*, and *A. amstelodami*, isolated from mouldy stored maize [*R.A.M.*, 31, p. 602], were grown on maize meal from which the oil had been extracted, and on similar meal with the addition of the oil originally extracted. All the species caused an initial increase in fatty acids in the oil-containing meal, but after reaching a peak acidity decreased. No comparable increase occurred in the oil-free meal. *P. solitum*, *A. flavus*, and *A. amstelodami* were more active fatty acid producers than *A. candidus* and *A. terreus* (one isolate of which was included in the tests). Dried mycelium of the five moulds contained active lipase, which was much more abundant in *P. solitum*, *A. flavus*, and *A. amstelodami* on a medium incorporating maize oil than on one with sucrose as the carbohydrate source. All five species were capable of utilizing two or more of the four constituent fatty acids of maize oil as carbon sources.

Böning (K.). **Krankheiten und Schädlinge an Mais.** [Diseases and pests of Maize.] —*Pflanzenschutz*, 4, 9, pp. 103–107, 7 figs., 1952.

The principal maize disease in Germany is smut (*Ustilago maydis*) [C.M.I. map No. 93], while other pathogens include rust (*Puccinia maydis*) [*P. sorghi*: *R.A.M.*, 15, p. 207], foot rots (*Fusarium* spp.), anthracnose (*Colletotrichum graminicola*), and leaf spot (*Helminthosporium maydis*) [*Cochliobolus heterostrophus*: ibid., 18, p. 245]. Essential information is presented on the symptomatology, etiology, life-histories, relation to environmental factors, and control of the causal organisms, all of which, except rust, are seed-transmissible.

Smut control is a matter of considerable difficulty. Seed treatment, while generally advisable, is effective only as a partial preventive against the introduction of the disease into a non-infested area, but even here the risk of long-distance spore flights must be taken into account. In small plantings the smutted material can be collected and burnt; where this is impracticable, the crop should be harvested promptly and transferred to the silo. At least three years should elapse before maize reappears in the rotation on infested fields, where farmyard manures should be replaced by synthetic fertilizers, especially calcium cyanamide, which will bring about a gradual decontamination of the soil.

Chowdhury (S.). **Citrus canker in Assam.**—*Plant Prot. Bull., New Delhi*, 3, 3, pp. 78–79, 1951. [Received October, 1952.]

During a survey of citrus varieties grown in Assam for their reaction to canker (*Phytomonas* [*Xanthomonas*] *citri*) [*R.A.M.*, 30, p. 263 and next abstract] it was found that Valencia orange, *Citrus reticulata*, and *C. grandis* [*C. maxima*] are rarely attacked, while *C. jambhiri-C. limonia*, *C. jambhiri*, and sour orange are never infected. In spraying trials at the Burnihat Citrus Research Station perenox (3 lb. per 100 gals.) and Bordeaux mixture (2–2–50) combined with albolenum (8 oz. per 100 gals.) were applied in the middle of April and then every 15 days to protect the new growths. The results were very promising, damage caused to fruits having been reduced from 85 to 5 per cent.

Chowdhury (S.). **Some observations on Citrus canker in Assam.**—*Sci. & Cult.*, 18, 5, pp. 246–248, 1 fig., 1952.

In further experiments on the control of citrus canker (*Xanthomonas citri*) [see preceding abstract] carried out at the Plant Pathological Laboratory, Jorhat, Assam, in 1950, Bordeaux mixture (4–6–50), Bordeaux oil emulsion, and perenox (4 lb. per 100 gals.), applied after each of the four flushes, usually in February–

March, May–June, September–October, and December–January, gave effective control, which was further improved by the addition of a sticker (resin or albolenum). No disease or only a trace of it was detected after spraying, while on the untreated trees infection was severe. Removal and burning of the affected twigs and sterilization of the soil around the plants by a flame-thrower are recommended to precede the above-mentioned treatments.

WAGER (V. A.). **The scab disease of Citrus.**—*Fmg in S. Afr.*, 27, 314, pp. 281, 288, 3 figs., 1952.

During the past few years scab (*Sphaceloma* [*Elsinoe*] *fawcetti* [C.M.I. map No. 125; *R.A.M.*, 30, p. 434], commonly occurring on lemons, has attacked a large grapefruit planting in Zululand, causing heavy losses. Neighbouring Valencia oranges were unaffected. A most noticeable feature of the Zululand outbreak, recurring during the past three seasons, was that only fruit on the south side of the tree was attacked.

The disease may be prevented [ibid., 30, p. 263] by a thorough application of 2–1–80 Bordeaux mixture plus spreader shortly after petal fall followed by another if there is heavy rain. Two sprays at an interval of ten days gave almost complete control in Zululand, whereas scab was very severe on unsprayed trees. It is controlled in the nursery by a routine Bordeaux spray, plus white oil if necessary, once every two months.

DUCHARME (E. P.), KNORR (L. C.), & SPERONI (H. A.). **Observations on the spread of tristeza in Argentina.**—*Citrus Mag.*, 13, 9, pp. 10–12, 14, 1951. [Abs. in *Biol. Abstr.*, 26, 4, p. 936, 1952.]

The authors describe the history, introduction, and course of tristeza root rot of citrus [*R.A.M.*, 32, p. 19] in Argentina [ibid., 31, p. 382 *et passim*] to indicate the sources of danger for areas as yet unaffected. The evidence indicates that the disease could have been disseminated in the Argentine Mesopotamia by (1) widespread distribution of the original infected shipment from South Africa [cf. ibid., 23, p. 223]; (2) promiscuous movement of budwood from affected centres; or (3) migration of insect vectors along 'bridges' of wild citrus trees between citrus-growing regions.

SANCHEZ BUEDO (E.). **The diseases, pests and hazards of growing Citrus crops in Spain.**—*Plant Prot. Overseas Rev.*, 3, 1, pp. 13–17, 1952.

Of the diseases affecting citrus in Spain discussed in this paper mention may be made of chlorosis [*R.A.M.*, 26, p. 102; 27, pp. 131, 520] and foliocellosis [zinc deficiency: ibid., 27, p. 234 and above, p. 177] attributed to excess and deficiency of lime, respectively, and sooty mould ('*Meliola camelliae*') [ibid., 2, p. 405; cf. 3, p. 211], aggravated by the presence of scale insects and controlled by cuprous oxide sprays.

GONZÁLEZ O. (C.), ARROYO B. (C.), & SOLÍS R. (F.). **Informe sobre el cultivo del Café en Santa Ana (El Salvador).** [Report on Coffee-growing in Santa Ana, El Salvador.]—*Suelo tico*, 4, pp. 343–354, 1950. [Abs. in *Hort. Abstr.*, 21, 4, p. 554.]

The factors contributing to the high yields of coffee in El Salvador [*R.A.M.*, 31, p. 374] are compared with those in Costa Rica [loc. cit.]. *Omphalia flavida* [*Mycena citricolor*: loc. cit.] and other [unspecified] leaf diseases are not very widespread in the former country because climatic and other conditions are unfavourable for them, and 90 per cent. of the coffee varieties grown are Bourbon or Bourbon hybrids.

Narasimhaswamy (R. L.). **Leaf disease resistance and its importance in Coffee.**—*Indian Coffee* (*Mon. Bull. Indian Coffee Bd*), 16, 2, pp. 26–28, 1952.

A general review is given of past work on the control of coffee leaf disease (*Hemileia vastatrix*) in South India [*R.A.M.*, 31, p. 15]. Spraying with Bordeaux mixture may result in 100 per cent. increase in yield, but presents many economic difficulties. Of all the foreign varieties and lines tested Robusta is the only acceptable one with a comparatively high resistance [ibid., 31, p. 605], high yield, and low cultivation costs. Despite its rather poor quality, production has increased from 3,282 tons on a 28,824 acre area in 1941–2 to the present 7,605 tons (60,374 acres). Hybrid plants with dominant resistance have been selected at Balehonnur Station and their progenies tested. S.288 [ibid., 29, p. 209], selfed from S.26, is resistant to races of *H. vastatrix* affecting the Coorg and Kent varieties and gives an average yield of 4·6 cwt. per acre compared with an average of 2·5 for Kent and Coorg. S.333, a resistant hybrid of S.31 and Kent, gives an average yield of 9·9 cwt. per acre.

Abrahão (J.) & De Andrade (A. C.). **A 'fome de potássia' ou 'vermelhão' nos algodoais do Estado de São Paulo.** [Potassium deficiency or 'rust' in the Cotton fields of the State of São Paulo.]—*Biológico*, 18, 6, pp. 91–102, 2 figs., 2 diags., 2 graphs, 1952.

The large-scale introduction into São Paulo, Brazil, of the Campinas I.A.–817 cotton variety has been accompanied since 1947 by a noticeable increase in potassium deficiency [*R.A.M.*, 17, p. 110; 21, p. 74; 25, p. 261], causing deterioration in the quantity and quality of the fibre. The average reduction in weight in the most severely affected areas is estimated at 20 per cent. It appears from the results of field experiments that Campinas I.A.–817 should not be cultivated on drained soils and that rotation with legumes should be practised on those of medium fertility.

Bouillenne (R.) & Bouillenne-Walrand (M.). **De l'influence des hormones végétales de synthèse sur la croissance de Fusarium vasinfectum.** [On the influence of synthetic plant hormones on the growth of *Fusarium vasinfectum*.] —*Bull. Acad. roy. Belg.*, Sér. 5, 37, 7, pp. 557–566, 1 pl., 1951.

At the Laboratory of Plant Physiology, Botanical Institute of the University of Liège, Belgium, the growth of *Fusarium vasinfectum*, the agent of cotton wilt [see next abstracts], in Richards's solution was definitely inhibited by the admixture of β-indolepropionic acid at concentrations of 200 mg. to 1 gm. per l. and temporarily suppressed by β-indoleacetic acid at the latter strength.

Activité de l'I. R. C. T. Année 1951. [The work of the I.R.C.T. Year 1951.]—*Cot. et Fibr. trop.*, 7, 1, pp. 5–126, 50 figs., 1952.

The following are among the items of phytopathological interest in the report of the Institut de Recherches du Coton et des Textiles Exotiques for 1951 [cf. *R.A.M.*, 31, p. 115]. Cotton in the Ubangi-Chari region of French Equatorial Africa suffers from the following pathogens, listed in descending order of importance: *Xanthomonas malvacearum*, *Nematospora coryli* and *N. gossypii* (agents of internal boll disease), *Fusarium vasinfectum* [see next abstract], *Glomerella gossypii*, a wet red rot of bacterial origin affecting the fibres and seeds within the capsules, *Macrophomina phaseoli*, *Corticium solani*, and a number of more or less innocuous foliicolous fungi. Seed infestation by *X. malvacearum* and *N.* spp. may amount to 40 and 58 per cent. on the Triumph Banda and Arkansas 17 varieties, respectively, in seasons conducive to the spread of infection, while under conditions favouring the host the average incidence is 20 per cent. Among other potentially harmful seed-borne species are *Aspergillus flavus*, *F. moniliforme* [*Gibberella fujikuroi*] var.

subglutinans, *F. javanicum* var. *radicicola*, and *F. scirpi* vars. *caudatum* and *filiferum*. Of 17 fungicides tested over a three-year period as cotton seed disinfectants, only sanigran (0·2 per cent.), granosan (0·3), granopera (0·5), and dow 9B (0·2) [loc. cit.] were of any value. Sanigran and granopera, of French manufacture, are now in use as treatments for mass multiplications.

In tests to determine the reaction of a number of varieties to *X. malvacearum*, the most resistant were NT 205/43, N'Kourala (particularly as regards the leaves), Fogri C12 (a selection of Foster), and BAR 10/2. The semi-resistant Foster is the most generally useful variety. Following inoculation, the bacterium traverses the following phases in its host: a five- to six-day incubation period; fall of heavily infected leaves on the 14th day (average); inception of petiolar necrosis on the 15th; spread of infection from the 14th day onwards; blackening of the main stem and bract infection on the 33rd day; and capsule invasion from the 57th day onwards.

A fungus collected in October, 1950, in the plantations of Uango and Bangassu is tentatively referred to *F. vasinfectum*. The symptoms developing in an average period of 11 days after inoculation were atypical in three plants out of every five.

Internal boll disease was prevalent throughout the year in the Ivory Coast, causing losses of over 30 per cent. of the green capsules on the N'Kourala and T.S.I. varieties.

Lagière (R.). **Possibilités de transmission de la fusariose du Cotonnier (F. vasinfectum Atk.) par les graines.** [Possibilities of transmission of Cotton fusariosis (*F. vasinfectum* Atk.) by the seed.]—*Cot. et Fibr. trop.*, 7, 1, pp. 146–148, 1952.

On 29th November, 1951, some ripe capsules of seven cotton varieties visibly infected by wilt (*Fusarium vasinfectum*) were collected in the experimental field at Bangassu, French Equatorial Africa [see preceding abstract]. After delinting a portion of the seeds, all were sown in Petri dishes on a thin layer of potato decoction agar at the rate of five seeds per dish. A fortnight later the percentages of delinted and untreated seeds on which the fungus had developed were 5·4 and 8·7, respectively. Postulating that in a field of 36 ares [1 are = 119·6 sq. yds.] containing 12,000 cotton plants, 48 (0·4 per cent.) will be infected but overlooked, and assuming that their production will be the same as that of the healthy material, and that seed transmission is 7 per cent., the proportion of infected seeds at harvest will be 0·02 per cent., equivalent to two seeds per kg. (20 kg. are distributed to each planter). Given a yield of 70 kg., the possibility of infection by this means would extend to four new plantations. These purely mathematical calculations take no account of the damage inflicted on the seed by defective methods of drying, processing, and storage, which may raise the coefficient of spread up to fivefold.

Heim (R.). **Trois Septobasidium du domaine Indo-Pacifique.** [Three *Septobasidium* species of the Indo-Pacific region.]—*Ber. schweiz. bot. Ges.*, 62, pp. 412–417, 1 pl., 2 figs., 1952.

Supplementary observations are presented on *Septobasidium pteruloides*, *S. simmondsii* [*R.A.M.*, 18, p. 59], and *S. aleuritidis* [ibid., 29, p. 588]. The last-named species has become so prevalent on *Aleurites fordii* in Madagascar that not one tree in 50 is altogether free from it. The fungus does not appear, however, to lessen the depredations of its associate, *Aonidiella aurantii*.

Rüdiger (W.). **Zur pathologischen Anatomie des Leins, Linum usitatissimum L.** [On the pathological anatomy of Flax, *Linum usitatissimum* L.]—*Phytopath. Z.*, 19, 1, pp. 34–47, 10 figs., 1952.

At the Institute for Bast Fibre Research, Niedermarsberg, Westphalia, the author studied the anatomy of flax plants infected by *Phoma lini* (possibly in association

with *P. exigua* [*R.A.M.*, 30, p. 38]), *Polyspora lini* [see next abstract], *Colletotrichum lini* [*C. linicola*: ibid., 29, p. 213], *Melampsora lini* [ibid., 29, p. 149], and *Fusarium lini* [ibid., 22, p. 97]. All the pathogens induced the following changes. The cortical parenchyma and conducting cells of the phloem are for the most part completely disorganized. Changes in the bast fibres are brought about, on the one hand, by the hypertrophy and subsequent collapse of entire cells, and on the other by corrosion of the cell walls by fungal enzymes. Alterations in the wood are expressed by discoloration, partial hypertrophy, and corrosion. Brown to yellow or red pigments are produced in the diseased tissues. The necrotic effect frequently outdistances mycelial development.

Culture experiments were performed to determine the cellulolytic potentialities of *F. lini*, *P. lini*, *Phoma lini*, *C. linicola*, *Alternaria tenuis* [ibid., 23, p. 300; cf. ibid., 26, p. 452], and *Trichothecium roseum* [loc. cit.]. The results indicated that all the organisms, through the operation of their enzymes, could disorganize the natural cellulose of cotton and flax, other forms of cellulose, and hemicellulose; only *F. lini* was able to attack wood, and only *T. roseum*, *A. tenuis*, and *P. lini* corroded cork to any extent.

Hoffmann (G.). **Die Pasmokrankheit des Leins in Mitteldeutschland.** [The 'pasmo' disease of Flax in central Germany.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 6, 6, pp. 107–109, 2 figs., 1952.

The first outbreak of 'pasmo' disease of flax (*Septoria linicola*) [*Sphaerella linorum*: C.M.I. map No. 18] at the Bernburg (Saxony-Anhalt) Plant Breeding Institute occurred during a warm, damp spell at midsummer, 1951. Starting from two small foci in plots of the Endress linseed variety, the fungus spread rapidly over a large, compact area, culminating in the premature death of the plants. Secondary infection by *Macrosporium* and *Alternaria* spp. was favoured by frequent rains during the critical period of the 'pasmo' epiphytotic. Endress was the most susceptible to *S. linorum* of all the 44 varieties and strains cultivated at the Institute, among which five remained free from infection, namely, N (severely attacked by *Polyspora lini* [*R.A.M.*, 31, p. 384 and preceding abstract]), Turkish summer-winter flax, F_2 1537, and St. 3704 and 370. Flax straw from two other local sources contained *S. linorum*.

Fifteen contributions to the literature on various aspects of 'pasmo' disease are briefly reviewed. The prospects of breeding for resistance among the varieties approved for cultivation in the eastern zone of Germany are considered to be poor, since field observations have revealed the susceptibility of the Boland, Lusatia, and Bernburg linseed varieties, in addition to Endress.

Pavlík (M.). **Mikroflora rhizosféry klíeních rostlinek Lnu pěstovaných v půdě sterilní a infikované sporami Fusarium lini Bolley.** [The microflora of the rhizosphere of Flax seedlings grown in sterile soil and in soil infested with *Fusarium lini* Bolley.]—*Sborn. čsl. Akad. zeměd.* [*Ann. Acad. tchécosl. Agric.*], 23, 3–4, pp. 198–203, 1950. [Abs. in *Biol. Abstr.*, 25, 12, pp. 3352–3353, 1951.]

Flax seedlings were grown in sterile soil or soil infected with *Fusarium lini* [C.M.I. map No. 32] for 12 days at 26° to 27° C., after which plates of Löhnis soil-extract agar or Czapek acid agar were poured from both rhizosphere soil and soil distant from the roots. Bacteria and fungi were more numerous in the rhizosphere than in distant soil. *Aspergillus glaucus* and related species predominated in the sterile soil and *F. lini* and *Penicillium* in infested soil. *Penicillium* multiplied in the rhizosphere of infected plants, although saprophytic bacteria and fungi were markedly reduced. The results support the view that the flax root system interferes, probably by excretions, in the competition between *F. lini* and saprophytic micro-organisms in favour of the former, thus facilitating infection.

Chowdhury (S.). **Linseed rust in Assam.**—*Plant Prot. Bull., New Delhi*, 3, 4, p. 119, 1951. [Received October, 1952.]

During the 1949–51 disease surveys in Assam only rust (*Melampsora lini*) [*R.A.M.*, 31, p. 539] was detected on linseed flax. Incidence was mild and caused only slight damage. In resistance tests 35 linseed types obtained from the Indian Agricultural Research Institute, New Delhi [loc. cit.], remained free from rust while the local types developed from 10 to 50 per cent. infection.

Diseases.—*Rep. Indian Jute Comm., 1950–51*, pp. 61–67, 1952.

In this section of the annual report [cf. *R.A.M.*, 22, p. 96] it is stated that in a date of sowing experiment leaf infection by *Macrophomina phaseoli* on jute [ibid., 32, p. 20] in India was heaviest during periods of high temperature and humidity. On July 5th, 1950, infection was restricted to plants sown from May to July, and of these the crop sown during the first week of May had the least infection; sowing later than the middle of May appears, therefore, to be unprofitable. Stubble bearing sclerotia initiated infection in sterilized field soil, mortality increasing with the addition of ammonium sulphate and being higher than in unsterilized soil similarly inoculated. Infection also occurred in unsterilized soil without the addition of inoculum. Pre-emergence mortality was higher than post-emergence infection. Since stem rot can be induced artificially in the field, selection for resistance will be facilitated. Less damage is likely to accrue from the use of ammonium sulphate if it is applied as a top dressing.

In a varietal trial relying on natural infection the *Corchorus capsularis* varieties C 41–13, C 39–212, Fanduk, D 154, and Deshimara had 1 to 3 per cent. stem rot infection, C 42–321, 3 to 6 per cent., Orissa 6, 6 to 12 per cent., and Jap Red, 50 to 75 per cent. One per cent. perenox checked leaf infection in a three-week-old crop of *C. capsularis*, but 2 per cent. was more effective and caused no scorching. All the pycnidiospores collected from leaves after spraying were dead.

In studies on chlorosis [ibid., 22, p. 96] the occurrence of a high proportion of affected individuals in the progeny of single chlorotic plant selections of *C. capsularis* and *C. olitorius* indicated seed transmission. The condition was also induced by grafting.

On p. 87 it is stated that when a downy mildew (*Plasmopara* sp.) epidemic affected the apical buds of mesta (*Hibiscus cannabinus*) the plants subsequently died. *Phoma sabdariffae* [ibid., 19, p. 221; 24, p. 371] occurred in epidemic proportions on *H. sabdariffa* and killed the plants. Bordeaux mixture (4–4–40) gave good control of leaf infection. Epidemic wilt in several plots of *Crotalaria juncea* was caused by a *Fusarium* sp. [ibid., 30, p. 165].

Guillemat (J.). **Le 'chancre de la tige' d'Urena lobata.** ['Stem canker' of *Urena lobata*.]—*Cot. et Fibr. trop.*, 7, 1, pp. 137–146, 6 figs., 1952.

A disease of *Urena lobata*, first reported from various localities of the Middle Congo early in 1951, is characterized by the development along the stems, from the root-collar to a height of 1 to 1·25 m., of up to six, usually one or two, oval, necrotic, canker-like lesions, which are most prevalent near flowering time. Uniformly brown at first, they subsequently assume an ashen-grey tinge at the centre and acquire a blackish to reddish-brown margin. These colour changes correspond to deep-seated alterations in the subjacent tissues, including the cortical parenchyma and phloem but not the thin cuticular pellicle occupied by the pycnidia of the causal organism. This pellicle usually ruptures, exposing bundles of fibres which are retted, stained, and breaking. The fungus may reach the secondary xylem and very occasionally necrosis may extend to the pith. The host reacts to infection by the copious gum secretion (especially after the retting of the fibres) through cracks

in the cankers. Sometimes the stems are completely girdled by the cankers, and reduction in fibre yield may reach 50 per cent., while the remaining stalks contain useless stained, deteriorated fibres which lower their value. The symptoms of the Congo disease resemble those reported on the same host from Kenya [*R.A.M.*, 31, p. 16] where, however, the canker is followed by a wilt and also healthy adventitious shoots are produced at soil-level; neither of these features has been observed in the Congo.

The Congo fungus is a new species of *Stagonospora*, for which the name of *S. urenae* is proposed [without a Latin diagnosis]. Its very numerous, black, globular to roughly elliptical, immersed, later semi-erumpent, thick-walled, smooth, dark brown pycnidia, 130 to 280 μ in diameter, are furnished with an ostiole of 15 to 20 μ, and their interior is lined with a hyaline network of hyphae bearing on stalks 3 μ in length thin-walled conidia with granular contents and measuring 16 to 28 by 6·5 to 8 (mean 24 by 7) μ. They emerge through the ostiole in a cirrous mass. Old pycnidia were also found to contain a few conidia of a different type, being tri- or more rarely biseptate, hyaline, cylindro-elliptical to irregular, pluriguttulate or granular, and measuring 24 to 29 by 6·4 to 8 (26·5 by 7·3) μ. Several other fungi were observed as secondary invaders of some of the cankers.

The examination of a large number of diseased stems revealed no trace of contamination through insect agency in 88 per cent.; traces of a perforation or puncture were perceptible in 10 per cent., and in the remaining 2 per cent. an insect or larva was present in the pith. Immediate plans for the control of the disease are concerned mainly with the development of resistant varieties.

Plant diseases. Spray Roses after pruning. Blossom-end rot of Tomatoes.—*Agric. Gaz. N.S.W.*, 63, 5, pp. 261–264, 5 figs., 1952.

The chief diseases affecting the quality of rose blooms in coastal and tableland districts of New South Wales and often greatly reducing the vigour of the whole plant are powdery mildew (*Sphaerotheca pannosa*) [*R.A.M.*, 25, p. 560], black spot (*Diplocarpon rosae*) [loc. cit.], anthracnose (*Sphaceloma rosarum*) [loc. cit.], and stem canker (*Coniothyrium fuckelii*) [*Leptosphaeria coniothyrium*: loc. cit. and C.M.I. map No. 185]. Free circulation of air is essential for the control of black spot. All four diseases are controlled by cutting out any weak or diseased shoots as close to the main stem or bud as possible and treating the wounds immediately with Bordeaux paint. All prunings and leaves should be burnt and the whole plant sprayed with 1–1–10 home-made Bordeaux mixture.

Blossom-end rot of tomatoes [*R.A.M.*, 29, p. 143] was unusually prevalent during the past season, probably owing to the very dry spring combined with rather wide variations in temperature. A satisfactory soil water content should be maintained by adequate drainage, the use of sprinklers or open furrow irrigation to avoid drought, and farmyard manure or green manure crops to retain moisture. Windbreaks are required in exposed positions subject to hot, dry winds. In general, the varieties bearing small, flat fruits show resistance [ibid., 27, p. 453; 29, p. 291].

[Matthews (J. W.)]. **Daphne can be dangerous.**—*N.Z. Gdnr*, 9, 3, pp. 162–163, 1952.

During the past few years thousands of *Daphne odora* plants infected with cucumber mosaic virus [cf. *R.A.M.*, 22, p. 390; 31, p. 238] have been sold in New Zealand, with the result that the virus is now widespread throughout the country [ibid., 31, p. 319]. Affected *D. odora* plants display a diffuse pale green or yellowish mottle with scattered necrotic spots or small, irregular dead areas. The leaves are usually small and narrow with irregular margins, and are often twisted to one side. The plants are commonly stunted, young leaves being bunched near the shoot

apices. Older leaves usually fall, leaving the lower parts of the stems bare, and flowering is much reduced. On *Anemone coronaria* [cf. ibid., 30, pp. 23, 362] soon after infection with the same virus the leaves become coppery-purple, but this colour subsequently disappears; the leaves are generally curled, with short petioles, and the plants stunted; the flower petals, the edges of which are often split or irregular, tend to roll in from the tips. On calla (*Zantedeschia* spp.) [cf. ibid., 14, p. 587] leaves there is a mild chlorotic mottle or marked vein yellowing. Diseased *Delphinium* plants [cf. ibid., 25, p. 395; 30, p. 20] may develop a pale green mosaic mottle or become completely yellowed; chlorotic ring spots may appear on the leaves, which may become narrow and distorted, generally with large chlorotic areas. Leaves of affected violets [ibid., 19, p. 61] bear a pale mottling and the flowers a white streaking.

Moreau (Mireille). **Une cause nouvelle de dépérissement des Œillets à Nice : la maladie à sclérotes.** [A new cause of decline of Carnations at Nice: the sclerotial disease.]—*C. R. Acad. Sci., Paris*, 234, 27, pp. 2641–2643, 1952.

The sclerotial fungus isolated from the root-collar of Anita carnations suffering from a severe decline at Nice was referred to *Sclerotium bataticola* [*Macrophomina phaseoli*: cf. *R.A.M.*, 28, p. 485]. The disease has been present in the region of Nice for ten years or so and is becoming progressively more destructive. Cultures of the fungus developed well at 20° C. [cf. loc. cit.] as long as they were kept in the dark.

Schmidt (Trude). **Nelkenkrankheiten und ihre Ursachen.** [Carnation diseases and their causes.]—*Pflanzenarzt*, 5, 11, pp. 5–6; 12, p. 6, 1952.

The following diseases affecting carnations in Austria are briefly described in semi-popular terms, with directions for their control: damping-off (*Pythium debaryanum*, *Moniliopsis aderholdi*, *Fusarium* spp., etc.); *Fusarium* wilt (*F.* spp.); rust (*Uromyces caryophyllinus*) [*U. dianthi*]; 'blackening' (*Heterosporium echinulatum*) [*Didymellina dianthi*: *R.A.M.*, 29, p. 260], characterized by the production of white to grey-brown, mostly dark red-bordered lesions, on the leaves, stems, and sepals; and flower bud rot (*Alternaria dianthicola*) [ibid., 32, p. 80].

Gould (C. J.). **Gladiolus dry rot tests in Western Washington.**—*Gladiol. Mag.*, 15, 3, pp. 2, 76, 1951. [Abs. in *Biol. Abstr.*, 26, 4, p. 939, 1952.]

The information in this paper on the control of *Gladiolus* dry rot (*Sclerotinia gladioli*) has already been noticed from another source [*R.A.M.*, 30, p. 469]. [It also appears in *Flor. Rev.*, 107, 2771, p. 25, 1951.]

Nelson (R.) & Mooar (Marie). **Life history of the Stemphylium that causes red leaf spot of Gladiolus.**—*Phytopathology*, 42, 7, pp. 363-366, 2 figs., 1952.

This is an expanded account of the life-history of the species of *Stemphylium* causing red leaf spot of *Gladiolus* [*R.A.M.*, 31, p. 239], a preliminary note on which appeared in *Phytopathology*, 39, p. 16, 1949.

Sclerotia developed in profusion on potato agar and some exceptionally large ones which appeared on one of the original plates from cultured tissue of spotted leaves of the Picardy variety gave rise to perithecia with (19 months after seeding the plates) mature ascospores. The stromata were covered with erect, dark brown setae. The necks of the ascocarps protruded 1 to 2 mm. above the surface of the stroma, but no true ostioles were observed. The perithecia occurred in groups of two or three, but only one in a single stroma contained mature ascospores, which in monospore culture produced *Stemphylium* spores.

The perithecia measure 460 to 964 by 396 to 555 (average 725 by 495) μ and the

light tan to dark brown, uni- to quinqueseptate ascospores 29 to 70 by 11 to 30 μ. The dimensions of the smooth to echinulate, elongated conidia, which are of the same colour as the ascospores, are 14 to 22 by 8 to 14 μ. The morphological characters of the ascigerous stage indicate a close relationship to *Pleospora herbarum*. Inoculation tests with conidia and ascospores at the Michigan Agricultural Experiment Station, East Lansing, in 1946 resulted in the development of typical red leaf spot symptoms on *Gladiolus*.

Morel (G.) & Martin (C.). **Guérison de Dahlias atteints d'une maladie à virus.** [Cure of Dahlias attacked by a virus disease.]—*C. R. Acad. Sci., Paris*, 235, 21, pp. 1,324–1,325, 1952.

The apical meristems of Rêve Rose dahlias severely infected by *Dahlia* mosaic virus [*R.A.M.*, 31, p. 121], grown on Knop's medium at half-strength plus 2 per cent. glucose and yeast extract (0·5 gm. per l.), gave rise to leafy shoots which were grafted on young, virus-free greenhouse plants. When the grafts had attained a length of 10 cm. or so, they were planted out under insect-proof cages. The plants developed normally and without mosaic symptoms, thereby confirming the hypothesis that the virus does not penetrate into the apical meristem.

Slade (G. H.). **The use of copper naphthenate as a fungicide barrier in seed raising.** —*Aust. Orchid Rev.*, 17, 4, pp. 139–140, 1952.

Copper naphthenate is recommended for use on cotton wool stoppers as an excellent barrier against fungus and bacterial invasion of [orchid] seedling cultures under aseptic conditions. It minimizes secondary infection. The vessel containing the plug is inverted and the cotton wool dipped in a solution of the fungicide in an organic solvent. A week is allowed to elapse for the solvent to evaporate. The impregnated plugs must not be autoclaved or flamed.

Valenta (V.). **Virózne odchýlky na Begonia hybr.** [Virus abnormalities on a *Begonia* hybrid.]—*Ochr. Rost.* [*Plant Prot., Prague*], 23, 3, pp. 195–199, 2 pl., 1950. [Russian and English summaries.]

Abnormalities observed in Czechoslovakia on the *Begonia* hybrid Gloire de Lorraine and postulated to be of virus origin include leaf mottling, marginal chlorosis, the formation of ascidia, and transitional stages to the cowl-shaped form, also petalody and phyllody of the flowers. These anomalies are all unstable.

Roberts (D. A.) & Weber (G. F.). **Seasonal relations of silky thread blight, Rhizoctonia ramicola W. & R.**—Abs. in *Phytopathology*, 42, 5, p. 287, 1952.

On about 50 per cent. of its previously recognized hosts *Rhizoctonia ramicola*, the agent of silky thread blight of some perennial ornamentals in Florida [*R.A.M.*, 30, p. 612], failed to survive the severe winter of 1950–1, but it reappeared on most of them, and was detected on a new one, high bush blueberry (*Vaccinium irrigatum*), during the following excessively wet and hot summer. The basidial state of the fungus was present on several plants during August.

Richter (H.). **Wie steht es um die Cyclamenwelke?** [What is the position as regards *Cyclamen* wilt?] —*Gartenwelt*, 51, 14, pp. 224–225, 2 figs., 1951. [Received January, 1953].

Cyclamen plants in Germany sustain damage from *Fusarium oxysporum* [var. *aurantiacum*: *R.A.M.*, 14, p. 585], responsible for a destructive wilt which is controllable only by stringent sanitary precautions, including the treatment of boxes before each planting with a preservative of the Wolman salts type and steam sterilization of the soil.

Nicolas (G.) & Aggéry [Berthe]. **Sur un mode d'action très particulier de Cystopus bliti (Biv.-Bern.) Lév.** [On a very special mode of action of *Cystopus bliti* (Biv.-Bern.) Lév.]—*Bull. Soc. mycol. Fr.*, 67 (*1951*), 4, pp. 419–421, 1 fig., 1952.

In September, 1950, a plant of *Amaranthus viridis* was found near Foix, [Ariège, France], with the terminal 25 cm. of the stem bent in a crook shape. The curved portion was slightly swollen with longitudinal cracks, some extending for the length of an internode, in which were exposed oospores of *Cystopus bliti* [cf. *R.A.M.*, 27, p. 543]. No conidia were observed on the leaves or on those of neighbouring plants, and it would appear that the mycelium developing in the stem of the young plant without prior infection of the leaves produced oospores without first forming conidia.

Pilet (P.-E.). **Problème hormonal concernant l'Endophyllum sempervivi Lév. parasite du Sempervivum tectorum.** [A hormonal problem concerning *Endophyllum sempervivi* Lév., a parasite of *Sempervivum tectorum*.]—*Ber. schweiz. bot. Ges.*, 62, pp. 269–274, 2 figs., 1 graph, 1952.

Investigations at the University of Lausanne on *Sempervivum tectorum* leaves parasitized by *Endophyllum sempervivi* [*R.A.M.*, 16, p. 633] revealed a much higher auxin content than in normal ones. It reached a peak of 10^{-4} mol. β-indoleacetic acid, as compared with 10^{-7} in healthy material, in the lower two-thirds of the leaf.

Allison (J. L.). **Rhizoctonia solani, a foliage pathogen of forage legumes and grasses in southeastern United States.**—Abs. in *Phytopathology*, 42, 5, p. 281, 1952.

Most of the information in this paper on the pathogenicity of *Rhizoctonia* [*Corticium*] *solani* to fodder crops in the south-eastern United States [cf. next abstract] has already been presented from another source [*R.A.M.*, 31, p. 19], but mention is made of bean [*Phaseolus vulgaris*], smooth brome grass [*Zerna inermis*], and bluegrass [*Poa* spp.] as hosts of the fungus besides those previously listed.

Atkins (J. G.). **Forage crop Rhizoctonia cross inoculation tests.**—Abs. in *Phytopathology*, 42, 5, p. 282, 1952.

Various forage crops, including fescue [*Festuca*], trefoil [*Lotus* spp.], and *Lespedeza*, are liable to severe damage from aerial blight (*Rhizoctonia*) [cf. preceding abstract] in southern Louisiana under humid conditions during the summer. The same strain of the fungus is also prevalent on Bermuda grass [*Cynodon dactylon*]. Each host consistently yielded the *Rhizoctonia* [*Corticium*] *sasakii* type of the pathogen [cf. *R.A.M.*, 26, p. 415; see below, p. 223]. In cross-inoculation tests isolates from the four hosts attacked fescue, trefoil, and *Lespedeza* as well as soybean, snap bean [*Phaseolus vulgaris*], cowpea (which was comparatively resistant), and fig. It would appear from these results that the blight occurring on Alta and Kentucky 31 fescue (fairly recent introductions into the State) and that long observed on *Cynodon dactylon* are caused by the same strain of the fungus.

De Urries (M. J.). **Infektionsversuche an Gräsern mit zwei Rassen von Puccinia graminis tritici in Spanien.** [Inoculation experiments on grasses with two races of *Puccinia graminis tritici* in Spain.]—*Ber. schweiz. bot. Ges.*, 62, pp. 363–369, 1952.

A tabulated account is given of inoculation experiments performed on grasses at the Botanical Garden, Madrid, with three uredospore isolates of *Puccinia graminis tritici*, of which two, 828 and 876, from cereals in Almeria, Spain, and the Canary Islands, proved to belong to physiologic race 24 [*R.A.M.*, 31, p. 377], while

the third, designated 2A and collected on *Berberis hispanica* in Cuenca, Spain, is new.

The results were in general agreement with those obtained in other countries [cf. ibid., 8, p. 764; 9, p. 438; 12, p. 273; 26, p. 290; 32, p. 121]. Certain species of *Aegilops*, *Bromus*, *Elymus*, *Hordeum*, and *Triticum* were very susceptible, while all those of *Agrostis*, *Arrhenatherum*, *Brachypodium*, *Holcus*, and *Lolium*, and the majority of *Anthoxanthum*, *Alopecurus*, *Avena*, *Festuca*, and *Poa*, were immune or highly resistant. A few rye plants were fairly susceptible, but as a rule only very small pustules were formed.

Straib (W.). **Beiträge zur Kenntnis der an Futtergräsern auftretenden Rostpilze.** [Contributions to the knowledge of the rust fungi occurring on pasture grasses.] —*Zbl. Bakt.*, Abt. 2, 107, 1–4, pp. 1–39, 32 figs., 1952.

Personal observations and the inspection of pasture grass samples from different parts of Germany revealed a high incidence of rusts [*R.A.M.*, 22, p. 484] in 1941 and more particularly in the two following years. The predominant species were *Puccinia coronata* formae on *Agrostis alba* [*A. stolonifera*], *Alopecurus pratensis*, *Arrhenatherum elatius*, *Festuca pratensis*, *Holcus lanatus*, *Lolium multiflorum*, and *L. perenne*; *P. graminis* on *F. pratensis*, *Phleum pratense*, *Poa alpina*, and *P. pratensis*; *Puccinia arrhenatheri* on *A. elatius*; *P. perplexans* on *Alopecurus pratensis*; *P. poae-sudeticae* [*P. poae-nemoralis*] on *Poa pratensis* [ibid., 30, pp. 274, 602], *P. compressa*, and other grasses; *Puccinia poarum* on *Poa pratensis* [ibid., 30, p. 274] and *P. palustris*; and *Uromyces dactylidis* on *Dactylis glomerata* [ibid., 21, p. 203].

Specially damaging to the after-growth of pasture grasses is *Puccinia coronata* on *L. perenne*, *L. multiflorum*, *F. pratensis*, and *Arrhenatherum elatius*, and sometimes on *Agrostis stolonifera* and *A. intermedia*. The most important rust of *Poa* spp. in Germany is evidently the brown *Puccinia poae-nemoralis*, two formae speciales of which were differentiated, one on *Poa pratensis* and the other on *P. palustris*.

The host range of the principal grass rusts was more precisely delimited by inoculation experiments on 284 species. It was relatively narrow for *Puccinia arrhenatheri*, *P. poae-nemoralis*, *P. poarum*, *P. symphyti-bromorum*, and *U. dactylidis*, but wider for *P. coronata* than was formerly assumed. Within the formae speciales are races of differing pathogenicity. Thus, of two *Lolium* races of *P. coronata*, one severely attacks both *L. multiflorum* and *L. perenne* in the greenhouse, while the other is confined to the latter species. Again, two races were distinguished on *Arrhenatherum elatius*, one pathogenic and one innocuous to *Lamarckia aurea*, and, moreover, the race occurring on *H. lanatus* is not the same as that on *H. mollis*.

Differences were observed in the reactions of the cultivated varieties of *Lolium*, *Festuca*, and *Agrostis* spp. to *P. coronata* and of *Poa pratensis* to *Puccinia poae-nemoralis*.

Donnelly (E. D.). **Screening for wilt resistance in Alfalfa.**—*Agron. J.*, 44, 7, pp. 386–387, 1952.

At the Alabama Polytechnic Institute, Auburn, an attempt was made to increase the frequency of genes for resistance to lucerne wilt (*Corynebacterium insidiosum*) [*R.A.M.*, 26, p. 495] by first 'screening' a population of 750 four-month-old seedlings of the susceptible Ontario Variegated variety and securing seed from the selected healthy individuals by allowing them to interpollinate under rotation [cf. ibid., 13, p. 774]. Four months after inoculation by immersion of the cut roots in a bacterial suspension, 130 (17·3 per cent.) of the plants were free from symptoms, 195 (25·3) were lightly to heavily infected, and 425 (57·3) were dead. The wilt-free plants were reinoculated and planted in an isolated field, and in the following

winter 100 seedlings from each of 15 plants, selected at random from those that had produced 100 or more seeds, were planted in four randomized blocks in the greenhouse and inoculated once by root immersion at transplanting and three times by clipping the tops with contaminated shears at monthly intervals. An analysis of the wilt reactions at eight months revealed a range of susceptibility in the 15 families of 3·4 to 4·6 in a scale where 1 is least and 5 the most susceptible, the proportion of resistant individuals not being significantly different from that in the original variety. The 128 surviving wilt-free parents were inoculated hypodermically through the tap-root in June of the second summer in the field and classified ten weeks later, by which time two were dead, 13 heavily, 13 moderately, and 28 lightly infected, while 72 were still apparently healthy.

The results indicate that a certain number of susceptible plants either escape infection or do not rapidly develop perceptible symptoms, the selection technique employed being inadequate for their complete elimination. Probably the most efficient procedure for a large population with a low frequency of genes conditioning wilt resistance would be to use the method herein described to discard most of the susceptible individuals, using needle injection to reduce the number of escapes among older plants.

Vlitos (A. J.) & Preston (D. A.). **Seed treatment for field legumes.**—*Bull. Okla. agric. Exp. Sta.* B-332, 11 pp., 1949. [Received October, 1952.]

The results of the five replicated field and greenhouse experiments carried out at the Oklahoma Agricultural Experiment Station from September, 1946, to July, 1948, to determine the effect on plant stand [*R.A.M.*, 20, p. 211; 24, p. 60] and nodule formation of variation of dosage rates of various chemicals [ibid., 32, p. 69] indicate that the lucerne seed responded significantly to treatments with phygon and arasan (48 to 52 and 49 to 51 per cent. germination against 27 per cent. for the control). Mung bean [*Phaseolus mungo*] seed reacted most favourably to phygon, Chinese Red cowpea to arasan, phygon, spergon, or Dow 9B, Yellow hop clover to spergon, and hairy vetch [*Vicia hirsuta*] to arasan. Ceresan M was injurious to all the legume seed tested. Nodulation was not inhibited by chemical treatment, phygon and arasan actually enhancing nodulation on lucerne and Chinese Red cowpeas.

Bhide (V. P.), Patel (M. K.), & Dhande (G. W.). **Fusarium wilt of Lang (Lathyrus sativus L.): isolation of wilt resistant types.**—*Indian Phytopath.*, 4, 2, pp. 181–188, 1951. [Received 1952.]

Four types of lang (*Lathyrus sativus*) received from Indore, India, and selections from the Broach district, Bombay Province, and from Poona were tested for resistance to wilt (*Fusarium orthoceras* var. *lathyri*) [*R.A.M.*, 28, p. 19; 29, p. 509] under field conditions in an artificially infested plot at Poona in the seasons 1938–9 and 1939–40. Plants with a high degree of resistance were selected for further trial in the greenhouse at Poona (1940–1) under optimum conditions for infection. The survivors were transplanted to a wilt-infested plot and selfed seed from them was tested in the greenhouse during the next two seasons.

Culture Indore T.2–1 remained completely free from wilt throughout the trials and exhibited no segregation. Seed is being multiplied. After further selection a homozygous resistant line Indore T.2–12 was secured. In field tests both strains out-yielded local lang and are now recommended for general cultivation in the Broach district.

Ramsfjell (T.). **Skadedyr og sjukdommer som kan spreies med frukttrær og bærbusker fra planteskoler.** [Pests and diseases which can be spread with fruit

trees and fruit bushes from nurseries.]—Reprinted from *Gartneryrket, 1952*, 14, 17 pp., 34 figs., 1952.

Brief, descriptive notes are given on diseases which can be spread in fruit trees and bushes despatched from nurseries and a key for their determination is appended.

Sörgel (P.). **Über die Wirksamkeit verschiedener Bekämpfungsmittel gegen Apfelschorf zur Nachblütespritzung in Unterfranken.** [On the efficiency of various preparations for Apple scab control in post-blossom sprays in Lower Franconia.]—*Pflanzenschutz*, 4, 8, pp. 91–95, 1 fig., 1952.

It appears from the results of post-blossom spraying experiments in Lower Franconia in 1950 and 1951 that in the predominantly dry local climate copper-containing anti-scab [*Venturia inaequalis*: *R.A.M.*, 31, p. 534] preparations, such as Wacker 83, copper nirit, and wettable sulphur with a copper adjuvant, may safely be applied at this stage to seven of the nine varieties tested, namely, Ananas, Berlepsch, Champagner, Golden Pearmain, James Grieve, Klar [Transparent], and Ontario. The most tenacious of the fungicides in both years was Wacker 83 (0·75 and 1 per cent.), and in 1951 the mercurial B8186 at 1 per cent. Two applications should be given to ensure adequate control.

Wenzl (H.). **Die therapeutische Bekämpfung des Apfelschorfes (Venturia inaequalis).** [The therapeutic control of Apple scab (*Venturia inaequalis*).]—*PflSchBer.*, 8, 5–6, pp. 75–92, 1952. [English summary.]

A tabulated survey is given of experiments carried out in Austria in 1950 and 1951 to determine the efficiency of very highly concentrated mercurial sprays (with a content of 60 to 120 gm. mercury per 100 l. mixture) in scab (*Venturia inaequalis*) [*R.A.M.*, 31, pp. 190, 536] control on several apple varieties, including Ananas, Cox's Orange Pippin, Freiherr von Berlepsch, and Winter Golden Pearmain. The post-blossom treatments exerted an extremely potent eradicant effect on the pathogen but they were also, in some places at any rate, very injurious to the trees. A preparation known as antifruitschurft Duphar, containing 2·6 gm. mercury per 100 l., was not as effective as the foregoing in scab control but at least equal to normal lime-sulphur at 1·5 per cent.

Deshusses (L.) & Corbaz (J.). **Observations sur la fumure de plantation et les traitements appliqués.** [Observations on manuring of orchards and the treatments given.]—*Rev. hort. suisse*, 23, 6, pp. 205–207, 1950. [Abs. in *Biol. Abstr.*, 25, 12, pp. 3333–3334, 1951.]

A comparison was made over five years from planting of the relative efficiency of copper carbonate, sulphur, and a synthetic product M in controlling apple scab (*Venturia inaequalis*) in Switzerland [*R.A.M.*, 31, p. 190]. The variety Pomme Cloche, noted for susceptibility, was more resistant than the other varieties in this experiment. Copper carbonate was the most effective fungicide but at 1 per cent. caused russetting. The other two substances, though less efficient, are recommended.

Stapley (J. H.). **Low-volume spraying of top fruit.**—*Search*, *1952*, 4, pp. 18–21, 1952.

This paper on the control of apple scab [*Venturia inaequalis*] by a low-volume mercury spray is a reprint of an article noticed from another source [*R.A.M.*, 31, p. 133].

Berducou (Jeanne). **Le rôle de l'acide indol-β-acétique dans la formation des chancres parasitaires chez les végétaux.** [The role of β-indoleacetic acid in the formation of parasitic cankers in plants.]—*C.R. Acad. Sci., Paris*, 235, 4, pp. 309–311, 1952.

Further evidence is presented in support of the hypothesis already advanced that canker formation in apple trees invaded by *Nectria galligena* is due to the secretion by the fungus of β-indoleacetic acid [*R.A.M.*, 31, p. 126]. The fungus was grown on Knop's medium at half strength plus 30 gm. glucose and 13 gm. agar. Quantitative determinations were made by the standard *Avena* test and qualitative by the 'tendril' test devised by F. Nysterakis (*C.R. Acad. Sci.*, 226, p. 1917, 1948) [in connexion with studies on auxin secretion by insects]. The amounts of β-indoleacetic acid in the cultures of *N. galligena* kept in darkness for 45 days were 94 γ per kg. fresh substance in the hyphae and 112 γ in the medium, the corresponding figures for 90-day cultures exposed to the light being 108 and 88, respectively. The auxin was absent from cultures of *N. cinnabarina* under comparable conditions.

Siebs (E.). **Über die Schorfanfälligkeit von Birnen und die Aussichten auf ihre Resistenzzüchtung.** [On the susceptibility of Pears to scab and the prospects of breeding them for resistance.] —*Phytopath. Z.*, 18, 3, pp. 270–286, 8 figs., 1951.

Observations over a three-year period (1946 to 1948, inclusive) on the reactions to pear scab (*Venturia pirina*) of 20 varieties at the Max Planck Plant Breeding Institute, Voldagsen, Western Germany, where climatic conditions favour the disease, revealed a low incidence of infection. Not until 1949 did definite symptoms appear on several varieties which had previously been little affected. A survey of this kind, therefore, may easily lead to false conclusions regarding the severity of the disease, as was shown by the intensity of infection on the inoculated progeny of healthy varieties.

In inoculation experiments with strains of the pathogen from leaves and fruits [*R.A.M.*, 16, p. 45] the former organs were more resistant than the latter, but no clear-cut morphological differences between the two groups of isolates could be established.

Tests were performed to determine the influence of low temperatures on conidial germination [ibid., 26, p. 158] and perithecial development. Only 49 per cent. of the conidia in Pulst's nutrient solution germinated after three weeks following four days' maintenance at −9° to −13° C. before transference to 17° compared with 99 per cent. of those kept at room temperature all the time. On the other hand, the cold treatment stimulated the ripening of the perithecia [ibid., 7, p. 451], 96 per cent. of which were discharged after six weeks following the initial four days at −9° to −13° compared with 77 per cent. in the series held at 17° throughout. Conidia are more useful than ascospores as inoculum for current-season tests, though there is no difference between the two spore types in aggressiveness or power of adhesion.

The results of inoculation tests on one- and two-year-old pear seedlings of both fruit and perry varieties indicate that the latter, when relatively resistant, transmit this reaction to their descendants, whereas the resistance of the former is passed on only in an attenuated form. A susceptible fruit variety produced a comparatively high percentage of tolerably resistant seedlings. The percentages of practically scab-free one- and two-year-old seedlings were 2 and 3, respectively.

Microscopic examination of pear leaf infection by *V. pirina* disclosed striking analogies with the features of apple leaf scab (*V. inaequalis*) [ibid., 17, p. 607].

A systematic appraisal of the scab reactions of local pear varieties, initiated at the Institute in 1949, is still in progress. On the whole, the prospects of breeding for

resistance are considered to be quite as hopeful for pears as for apples. According to R. Koloc (Obstsorten Handbuch, Frankfurt-am-Main, 1948), nine of the 80 pear varieties grown in Germany are more or less resistant and can be used as parental material.

Canova (A.). **Marciume delle Pere causato da lieviti.** [Rot of Pears caused by yeasts.]—*Ann. Sper. agr.*, N.S., 6, 2, pp. 367–371, 1 pl., 1952. [English summary.]

Scipiona and Curato pears in Italy developed dark brown or leather-brown, roughly circular spots, which almost always began round a wound or a hole attributable to insect attack. The periphery of the spots shaded off into an olive-green halo a few mm. wide which grew paler as it merged into the normal colour of the epidermis. On every fruit some spots (usually in the broad part) coalesced, involving the whole surface. The affected area spread into the flesh, sometimes reaching the core. Diseased fruits fell before rotting completely, a symptom which distinguishes the disease from that caused by *Monilia* spp. [*Sclerotinia* spp.: *R.A.M.*, 5, p. 15; 15, p. 233]. According to the growers the disease appeared early in July and grew progressively worse up to harvesting time. It did not attack stored fruits.

Isolations from affected material gave *Torulopsis* [*Candida*] *pulcherrima* [cf. ibid., 18, p. 259; 22, p. 79; 24, p. 415; 25, p. 235], *Mycotorula* sp., and *Saccharomyces apiculatus*. Inoculations were positive only on wounded fruits; only *Mycotorula* sp. was pathogenic when used alone, though infection resulted following inoculation with *C. pulcherrima* and *S. apiculatus* together, *S. apiculatus* and *Mycotorula* sp. together, and all three together.

Bruer (H. L.) & Shepard (C. E.). **Wild Plum in relation to the control of phony disease.**—Abs. in *Phytopathology*, 42, 5, p. 282, 1952.

The survey for phony disease [phony peach virus: see next abstracts] in wild plum, initiated in 1950, is still in progress, 18,000 tests on material from 600 locations in 18 counties of 11 States having been performed by the acid technique [*R.A.M.*, 31, p. 68]. The disease was detected in Alabama, Arkansas, Georgia, Louisiana, Mississippi, North and South Carolina, Tennessee, and Texas; *Prunus injucunda*, *P. munsoniana*, and *P. umbellata* were added to the infected species [ibid., 30, p. 571]. The distribution and intensity of infection in wild plum and in peach are roughly coincident, and spread from the former to the latter is frequent in zones of general disease occurrence. In zones unfavourable to the disease in plum it may not spread appreciably to peach.

Shepard (C. E.) & Bruer (H. L.). **The incidence of phony disease in Plum thickets as related to proximity of infected Peach orchards.**—Abs. in *Phytopathology*, 42, 5, p. 287, 1952.

During 1951 wild plum stems from four counties of central Georgia were tested by a chemical procedure to determine whether the observed variation in the incidence of phony peach [virus: see preceding and next abstracts] was correlated with proximity of wild plum thickets to infected peach orchards. The disease in plum was found not to be dependent on peach as a source of infection. No appreciable difference in the incidence of the virus could be demonstrated between plum thickets immediately adjoining infected peach orchards and those situated at various but relatively short distances away. The disease was much more prevalent, however, in plum thickets in an area densely populated with infected peach plantings than in others of comparable ecology but distant from them. In general, the lowest average incidence of phony peach virus occurred in thickets in an uncultivated area surrounded by pine woods, but there were exceptions to this rule.

Persons (T. D.). **Phony peach disease—a review of organized control from 1929 to 1951 and the effect of recent developments on future control programs.**—Abs. in *Phytopathology*, 42, 5, p. 286, 1952.

Surveys from 1929 to 1951 in 26 of the United States disclosed the presence of peach phony [virus: see preceding and next abstracts], mostly in a mild form, in 17. Subsequently the disease was eliminated from six States and partially eradicated from eight others, but it reappeared in a number of counties, evidently as a result of infection from wild plums. Under the existing quarantine regulations [*R.A.M.*, 30, p. 143] nursery sites must be located at least 300 yds. from wild plums and ½ mile from infected commercial orchards or urban areas. Annual roguing of diseased trees is an effective method of control in commercial plantings; further reductions in virus incidence may be achieved by wild plum eradication and insect vector extermination.

KenKnight (G.). **Comparison of a phloroglucinol test with the acid one for phony.**—Abs. in *Phytopathology*, 42, 5, p. 285, 1952.

A freshly prepared methanol mixture of zinc chloride (saturated at 20° C.), 2 per cent. phloroglucinol, and 20 per cent. hydrochloric acid in the ratio 10:1:1 approximates in speed to 30 per cent. hydrochloric acid in methanol as a developer for the phony [peach virus] reaction [see preceding abstracts] and gives more apparently positive reactions. Thus, on wood sections the former frequently causes the development of red dots, indicative of a positive reaction, up to a few centimetres beyond the point where the wood ceases to react to the latter. On the other hand, the phloroglucinol test seems to be less specific than the acid for phony peach virus, since apparently positive responses were several times obtained on tangential wood sections of peach and plum (*Prunus angustifolia*) infected by peach rosette [mosaic virus: *R.A.M.*, 30, p. 329; 32, p. 43] which reacted negatively to the acid test.

Hiratsuka (N.). **White rust of Peach.**—*Plant Prot.* (*Japan*), 6, 6, pp. 256–278, 1952. [Japanese.]

The white and brown rusts, *Leucotelium* [*Puccinia*] *pruni-persicae* [*R.A.M.*, 28, p. 378] and *Tranzschelia discolor* [*P. pruni-spinosae*: C.M.I. map No. 223] often occur on the same leaves of peach trees in Japan, but the uredospores of the latter species are larger, longer, and thicker at the apex than those of the former. *Aecidium semiaquilegiae* on *Semiaquilegia adoxoides* was shown by inoculation tests to be the aecidial state of *P. pruni-persicae*.

Petersen (D. H.) & Dunegan (J. C.). **Present status of the Peach anthracnose problem in Georgia.**—Abs. in *Phytopathology*, 42, 6, p. 343, 1952.

Peach anthracnose (*Glomerella cingulata*), after an increase in severity each year from 1947 to 1950, inclusive, virtually disappeared from central Georgia [*R.A.M.*, 30, p. 476] following the destruction of commercial blue lupin plantings by low temperatures in 1951. The apparent correlation between the disease on lupin and its occurrence on peach [ibid., 29, p. 417] is based solely on circumstantial evidence, attempts to induce a severe outbreak on peach trees by spraying with spore suspensions having given conflicting results.

Issa (E.). **A 'podridão parda' e a 'sarna' do Pessegueiro.** [Brown rot and scab of Peach.]—*Biológico*, 18, 4, pp. 62–65, 1 fig., 1952.

The symptoms of peach brown rot (*Sclerotinia cinerea*) [*S. laxa*] and scab (*Cladosporium* [*Fusicladium*] *carpophilum*) are described from Brazil, with directions for their control by cultural practices and spraying [*R.A.M.*, 18, p. 401].

Taphrina padi (Jacz.) Mix.—*Plant Prot. Bull., New Delhi*, 3, 1, p. 31, 1951. [Received 1952.]

Taphrina padi [*R.A.M.*, 28, p. 548] is reported to be responsible for leaf curl on apricots in Uttar Pradesh.

Valenta (V.). **Toxické produkty metabolizmu Monilia laxa.** [A toxic metabolic product of *Monilia laxa*.]—*Ochr. Rost.* [*Plant Prot., Prague*], 23, 3, pp. 205–210, 1950. [Russian and English summaries.]

On certain media *Monilia* [*Sclerotinia*] *laxa* produces a toxin that causes rapid wilting of apricot plants [*R.A.M.*, 17, p. 536]. The substance is thermostable, non-volatile, soluble in ethyl alcohol, and strongly acid.

Stoll (K.). **Über die Symptome der Pfeffingerkrankheit der Kirschbäume.** [On the symptoms of the Pfeffinger disease of Cherry trees.]—*Phytopath. Z.*, 18, 3, pp. 293–306, 7 figs., 1951. [English summary.]

Information already presented on the Pfeffinger disease of cherries in Switzerland [*R.A.M.*, 31, p. 498] is recapitulated and supplemented by further observations on the morphological and anatomical changes induced in the leaves. Malformations and structural modifications are attributed in the first instance to pathological alterations in the veins. Phloem necrosis is demonstrable by the phloroglucinol-hydrochloric acid test [cf. above, p. 198], but the more frequent changes in the xylem may prove to be of greater diagnostic value. The process of development of enations and other excrescences on the leaves is outlined. No diagnostic importance is attached to anomalies in the extra-floral nectaries on the petioles of diseased trees. Superior varieties, such as Bing, Hedelfinger, and Gravium tend to decline more rapidly under the influence of Pfeffinger disease than those of poorer quality, but so far there has been no sign of either full resistance or symptomless carriers.

Milbrath (J. A.). **The mora virus disease of sweet Cherry.**—*Phytopathology*, 42, 7, pp. 347–348, 2 figs., 1952.

The mora virus disease, first observed on Napoleon sweet cherries near Salem, Oregon, in 1949, is so designated because it delays the ripening of the fruit by about six weeks. The leaves of branches with late-maturing fruit were yellowish-green and in severe cases stunted, cupped upwards and inwards, and disfigured by a blotchy, chlorotic mottling; no terminal growth was made. On the fruit spurs the foliage was rosetted and twisted. The fruits later mostly attained nearly normal colour and size. The same trees were similarly affected in 1951 and 1952.

Three Napoleon and two Bing trees were inoculated on 20th August, 1949, with ten buds each from the infected orchard trees. In 1950 one Napoleon developed leaf symptoms similar to those of the original trees, while the Bings developed severe lace leaf, apparently from a [cherry] ring spot virus contamination. In 1951 there was little or no lace leaf on the inoculated branches, but the leaves rolled like those of the diseased Napoleons.

On 21st September, 1950, five more Napoleons and four Bings, all known to be infected by cherry ring spot virus, were inoculated with ten buds each from the Napoleon inoculated in 1949. By 10th May, 1951, the inoculated branches on three of the Napoleons and one Bing showed evidence of virus transmission, the lateral growth just beyond the point of bud insertion being much reduced and the leaves twisted and cupped. The ripening of the fruits was retarded by more than a month and they were elongated, with a raised collar round the pedicel and a rugose surface like that of a lemon. The severity of the symptoms on both foliage and fruit of inoculated trees suggests a shock reaction to initial invasion. Later they develop the characteristic features of the disease as it occurs in nature.

The mora virus appears to be potentially serious, but at present its distribution is limited.

Novák (J. B.). **Virosy Ostružin (Rubus sp.).** [Virosis of Blackberries (*Rubus* sp.).] —*Ochr. Rost.* [*Plant Prot., Prague*], 23, 3, pp. 271–272, 1 fig., 1950.

A blackberry virus disease [cf. *R.A.M.*, 10, p. 329], streak mosaic virus, causing regular, partial to complete chlorosis and deformity of the leaves, was observed for the first time in Czechoslovakia in 1948 and again in 1949.

Felix (E. L.). **Crown rot of Strawberry.**—Abs. in *Phytopathology*, 42, 5, p. 283, 1952.

Strawberry crown and root rot, tentatively attributed to an unidentified fungus reported by Sherbakoff in 1924, has again been observed in Tennessee during the past five years. The symptoms include a colourless to brownish root rot, often covered with a prominent white mould, especially just below the mulch or soil surface, and tending to invade the surrounding areas; girdling or decay and mealiness of the stem bases; and rotting and sloughing of the lower petioles. Shoots invariably contract infection from diseased plants but runners remain healthy. Similar symptoms were produced on aseptically grown *Fragaria virginiana* seedlings by an apparently sterile isolate of the fungus obtained in 1949. It is characterized by clamp-connexions, occasional concentric zonation and sclerotial production, minimum, optimum, and maximum pH relations on buffered solutions of 2·2 to 3·3, 4·5, and 5·3, respectively, and minimum, optimum, and maximum temperatures on unbuffered potato dextrose agar of 11·5°, 27° to 32°, and 35° C., respectively.

Harper (J. L.). **Studies in the resistance of certain varieties of Banana to Panama disease. I. Internal factors for resistance and antibiotics. II. The rhizosphere.** —*Plant & Soil*, 2, 4, pp. 374–394, 1 graph, 1950. [Received January, 1953.]

In studies on Panama disease (*Fusarium oxysporum* [var.] *cubense*) [*R.A.M.*, 32, p. 135] disks of living tissue from suckers of Congo (immune) and Gros Michel (susceptible) bananas and agar media prepared from rhizomes of the same two varieties and Silk Fig (susceptible) and Guindy (resistant) supported free and equal growth of the pathogen. Alcoholic extracts of banana roots were antagonistic to *Bacillus subtilis*, *Bacterium* [*Pseudomonas*] *solanacearum*, and *Mycobacterium phlei*, but showed only ephemeral activity against *F. oxysporum* var. *cubense*.

The rhizosphere flora of different banana varieties was found to differ quantitatively. The genetically related varieties Congo and Gros Michel increased the soil microflora significantly more than Silk Fig and Guindy which are of common parentage. Within each genetic pair the highest soil population was supported by the susceptible varieties. A bacterium strongly antagonistic to *F. oxysporum* var. *cubense* [ibid., 26, p. 160] was isolated in large numbers from the rhizosphere of the immune Congo but was virtually absent from Gros Michel.

Fürst (H.). **Untersuchungen über die Wirkungen von hochmolekularen organischen Stoffen als Spritzmittel gegen Rostpilzinfektion.** [Studies on the effects of high-molecular organic substances as sprays against rust fungus infection.]—*Phytopath. Z.*, 19, 1, pp. 48–55, 1952.

Experiments at the Brunswick Technical Institute, Germany, in 1943-4 demonstrated that homologues of 2-alkyl heterocyclic compounds of pyridine and quinoline, transposed into quaternary N-methyl methosulphates, are effective against various rusts, preventing both uredospore germination and the establishment of infection. The compounds cannot be used alone, since they cause severe

scorching of the plants, but this defect is remediable by the addition of sulphite lye. The latter by itself is a prophylactic against a number of rusts, though its action is much less powerful than that of the complexes.

The following results were obtained in greenhouse tests at 15° to 20° C. Germination of *Puccinia antirrhini* uredospores on *Antirrhinum majus* [*R.A.M.*, 30, p. 567] was reduced from 30 per cent. to nil by spraying 24 hours before inoculation with 8 or 4 per cent. sulphite lye or the same combined with 0·25 per cent. pyridine-C_{13}-methosulphate, while the incidence of infection, gauged by the number of pustules per plant, was reduced from 110 on the untreated to 5, 15, 1, and 1, respectively. All the preparations inhibited uredospore germination of *P. triticina* on Michigan Amber wheat and prevented the severe infection that occurred on untreated plants. In the field an outbreak of peppermint rust (*P. menthae*) on the varieties Mitcham (from two locations) and Palatinate was reduced by two applications of 0·25 per cent. N-methyl-tridecylpyridinium methosulphate, the first on 27th August and the second on 15th September. The incidence of infection ranged from 2 to 5 per cent. on the untreated and from 0·5 to 2·5 on the treated plots.

In experiments at a horticultural institute 0·1 per cent. solutions of N-methyl-tridecylquinoline-methosulphate, supplemented by sulphite lye and adhesives, gave adequate control of vine downy mildew (*Peronospora*) [*Plasmopara viticola*].

For the present, however, the large-scale treatment of the above-mentioned agricultural crops with the new complexes would be uneconomic.

Van Raalte (M. H.). **Het effect van metaal-ionen op de fungistatische werking van natrium dimethyl dithiocarbamaat.** [The effect of metallic ions on the fungistatic action of sodium dimethyl dithiocarbamate.] *-Meded. Landb.-Hoogesch. Gent*, 17, 1, pp. 163–173, 1952. [English summary.]

In experiments at the Phytopathological Laboratory, Wageningen, Holland, the fungistatic action of sodium dimethyl dithiocarbamate on *Fusarium caeruleum* [*R.A.M.*, 32, p. 137] was inhibited by the addition to the nutrient medium of copper sulphate, the maximum effect of which was exerted at a dosage of 1 mol. per 2 of the fungicide.

Inhibition of the growth of *Aspergillus niger* in culture by sodium dimethyl dithiocarbamate or nabam [ibid., 28, p. 344; 31, p. 193] was accompanied by pallor of the conidia, a symptom of copper deficiency [ibid., 31, p. 32], the former compound being most active at 25 and the latter at 7·5 p.p.m. Hence it is considered probable that the dithiocarbamate combines with the copper in the cells of the fungus in such a way as to modify the catalytic activity of the element.

Rich (S.). **Using half-tree plots for increasing the efficiency of fungicide tests.**—*Phytopathology*, 42, 7, pp. 353–354, 1 graph, 1952.

This is an expanded account of studies at the Connecticut Agricultural Experiment Station on the use of half-tree plots in fungicide tests on apple trees, a preliminary note on which has already appeared [*R.A.M.*, 31, p. 563]. The method provides a more reliable estimate of error than the use of separate trees, since it is based on a larger number of degrees of freedom, this in turn permitting the discrimination of slighter differences between treatments.

Blackman (G. E.). **Studies in the principles of phytotoxicity. I. The assessment of relative toxicity.**—*J. exp. Bot.*, 3, 7, pp. 1–27, 10 graphs, 1952.

This introductory paper to the research work now in progress at the Department of Agriculture, University of Oxford, on various aspects of the general problem relating to the assessment of relative toxicity of chemical compounds to plants deals in particular with some of the methods used for the measurement and inter-

pretation of the effects produced by different groups of phytotoxic substances [see next abstracts]. The precise nature of the toxic action at cell level and the major factors determining the differences between species susceptible and resistant to injury have not so far been established. Consequently the precise assessment of relative toxicity must involve studies of effects on whole plants and at cell level. Comprehensive experiments on a wide range of hosts showed that the percentage inhibition of seed germination bears a sigmoid relationship to the amount of toxicant in the external medium, a similar relationship existing between percentage mortality and the concentration of spray solution applied to the leaves of young potted plants. Accurate comparisons of relative toxicity can be obtained only when the variation in response is measured at several dosages and the data treated by probit analysis [loc. cit.].

In the above experiments the relative toxicities of chlorinated phenoxyacetic acids [*R.A.M.*, 31, p. 249], alkyl phenylcarbamates, dinitro-alkylphenols, pentachlorophenol, thioacetic acid, and formamide were greatly dependent on the species, the order of toxicity being reversed from one species to another. Between compounds the germination results may or may not be comparable with those from spray applications. The physical characteristics of the spray solution partly determine the degrees of retention and penetration. For compounds with a low solubility in water the addition of a hygroscopic substance may increase the percentage kill, while for freely translocated materials the methods of growth analysis are of value for assessing toxic effects, especially of non-lethal dosages. As the effects on the growth of the component parts of the plant may differ considerably, conclusions based on a single criterion are likely to be erroneous, and since with some compounds (nitrophenols, for instance) at any one dose the depression in the growth rate remains constant with time, while with others (dichloro-phenoxyacetic acid, cupric salts) the depressant effect is cumulative, the nature of the growth response must be established prior to comparing the compounds.

Relative toxicity at cell level was studied by determining the concentration in an agar medium required to halve the growth rate of *Trichoderma viride* and by estimating the dosage required to bring about a standard effect on the respiration of yeast [*Saccharomyces cerevisiae*].

Sampford (M. R.). **Studies in the principles of phytotoxicity. II. Experimental designs and techniques of statistical analysis for the assessment of toxicity.**—*J. exp. Bot.*, 3, 7, pp. 28–46, 8 graphs, 1952.

A detailed description is given of some of the more important statistical methods used in the analysis of field and laboratory experiments concerned with studies of phytotoxicity [see preceding and next abstracts], quantal effects, such as the proportionate mortality, particularly being considered. Since the relationship between the proportionate response and some function of the dose or concentration of the toxicant generally follows a normal sigmoid law, the methods of probit analysis are appropriate for precise estimation. The calculations involved are illustrated and the design of experiments discussed. A brief description is also given of the methods of statistical treatment required in cases where the dose-response relationship does not conform to a normal sigmoid.

Simon (E. W.), Roberts (H. A.), & Blackman (G. E.). **Studies in the principles of phytotoxicity. III. The pH factor and the toxicity of 3:5-dinitro-*o*-cresol, a weak acid.**—*J. exp. Bot.*, 3, 7, pp. 99–109, 4 graphs, 1952.

Further research studies in the principles of phytotoxicity [see preceding abstracts] at the Department of Agriculture, University of Oxford, have shown that whereas the concentration of DNC required to halve the growth rate of *Tricho-*

derma viride or the respiration of yeast [*Saccharomyces cerevisiae*] was increased 75 to 100 times as the pH changed from 4 to 7 the concentration of a solution or suspension in spray form applied to white mustard (*Brassica alba*) seedlings needed to kill half the plants changed by a factor less than 2 over the same pH range. The explanation lies in the fact that the spray droplet is small and the pH effect is masked because the buffering capacity of the cells exceeds that of the droplets, the pH thus being determined by the tissues and possibly having little relation to that of the original solution. Similar effects were found for other weak acids such as chlorophenoxyacetic acids.

Fleming (R.). **Workhorse with wings.**—*Crops & Soils*, 3, 8, pp. 22–24, 4 figs., 1951. [Received January, 1953.]

A brief description is given of the first agricultural aeroplane specially designed for crop dusting, spraying, and fertilizing [*R.A.M.*, 31, p. 444]. It was built at the A & M College, Texas.

Hildebrand (E. M.). **Terminology in phytopathology.**—Abs. in *Phytopathology*, 42, 5, p. 283, 1952.

Commenting on the need for a revision of the terminology applied to non-pathogenic disorders of plants, the writer does not favour the substitution of 'physiogenic' for 'physiologic', and suggests the adoption of 'climatic disease' for environmental disturbances to which other designations are inapplicable.

Hauduroy (P.). **Le centre de collection de types microbiens.** [The collection centre for microbial types.]—*Bull. Soc. Path. exot.*, 44, 3–4, pp. 133–135, 1951. [Abs. in *Biol. Abstr.*, 26, 4, p. 941, 1952.]

The Centre de Collection de Types microbiens, established at Lausanne, Switzerland, by UNESCO, maintains a collection of bacteria, fungi, and viruses for free distribution and also has lists of 70 collections in 24 countries.

Martyn (E. B.). **Diseases of economic plants in Trinidad and Tobago.**—*Bull. Dep. Agric. Trin. Tob.*, N.S., 2, 30 pp., 6 pl., [? 1952].

This list of diseases of economic plants in Trinidad and Tobago, previously noticed [*R.A.M.*, 32, p. 65], is here published as a separate bulletin.

Richter (H.). **Bedeutung und Probleme des Pflanzen- und Vorratschutzes.** [Importance of and problems connected with the protection of plants and stored commodities.]—*Umschau*, 51, 19, pp. 577–578, 1951. [Received January, 1953.]

Data are presented on the losses incurred through pests and diseases in Germany, based largely on the estimates of Morstatt and figures obtained prior to 1931 [cf. *R.A.M.*, 8, p. 455; 29, p. 421].

One of the many aspects of plant protection requiring investigation is the epidemiology of diseases as a means to the establishment, in close co-operation with meteorologists, of an effective prognosis and warning service—the foundation of practical control. Other tasks are concerned with the breeding of disease-resistant varieties and the development of plant-protectives combining a high degree of efficiency with harmlessness to man and livestock.

Gattani (M. L.). **Production of better penicillin-producing strains by mutations induced by uranium nitrate.**—*Science*, 116, 3022, pp. 596–597, 1952.

Studies at Bharatpur, India, demonstrated that the addition of 1, 1·5, or 2 gm. uranium nitrate per l. [*R.A.M.*, 28, p. 233] to nutrient media induced desirable

mutations with respect to penicillin-producing ability in *Penicillium notatum chrysogenum* [*P. chrysogenum*] strain 18 and Minnesota X 1612. The mutation rate is enhanced two or three times if the fungus is grown first on a medium (potato dextrose agar) containing a low concentration of uranium nitrate (0·5 gm. per l.) and then transferred to the higher concentration. Mutants 18G and X 1612-C both showed increased penicillin production over the parent strains.

Gauze (G. F.). Антибиотики в борьбе с болезнями растений. [Antibiotics in the control of plant diseases.]—Природа [*Nature = Priroda, Moskva*], 41, 6, pp. 105–107, 1952.

This paper recapitulates information dealing with the value of antibiotics in controlling plant diseases, most of which has already been noticed from other sources [*R.A.M.*, 30, p. 334; 32, p. 140].

Faivre-Amiot (A.), Darpoux (H.), & Roux (L.). **Sur un nouvel antibiotique, la chlamydosporine, isolé d'un Fusarium.** [On a new antibiotic, chlamydosporin, isolated from a *Fusarium*.]—*C.R. Acad. Sci., Paris*, 235, 16, pp. 912–913, 1952.

A species of *Fusarium* isolated from mummified insects produced a large number of chlamydospores in culture and secreted a highly active antibiotic with a hitherto unreported biological spectrum and distinctive physico-chemical attributes, which is named chlamydosporin. The minimum quantities required to inhibit the growth of 24-hour-old cultures of *Agrobacterium* [*Bacterium*] *tumefaciens* [cf. *R.A.M.*, 31, p. 583] and *Xanthomonas malvacearum* [ibid., 32, p. 140] at 37° C. were 50 and 0·8 μgm. per ml., respectively.

Heseltine (W. W.). **Sodium propionate and its derivatives as bacteriostatics and fungistatics.**—*J. Pharm., Lond.*, 4, 8, pp. 577–581, 1952.

In the author's experiments at the Technical Division, Harker Stagg Ltd., London, sodium propionate [*R.A.M.*, 30, p. 382] inhibited the growth of a number of bacteria and fungi pathogenic to man, but species of *Penicillium* and *Cladosporium* continued to multiply in media containing 6 per cent. of the compound, a matter of some interest in view of the widespread use of propionates for the preservation of bread and other foods [ibid., 25, p. 174]. The bacteriostatic and fungistatic effect is attributed to the molecule rather than the ion, and it is suggested that inhibition of growth is associated with the carbohydrate metabolism of the micro-organisms.

Walker (Alma T.) & Smith (F. G.). **Effect of actidione on growth and respiration of Myrothecium verrucaria.**—*Proc. Soc. exp. Biol., N.Y.*, 81, 2, pp. 556–559, 1 graph, 1952.

At the Department of Botany and Plant Pathology, Iowa State College, the effect of actidione [*R.A.M.*, 31, pp. 449, 528] on the germination and the spore and mycelial respiration of *Myrothecium verrucaria* was measured by dosage-response curves and LD 50 values, as well as by changes in percentage inhibition with time. Spore respiration was about four and ten times as sensitive as germination and mycelial respiration, respectively. Only a small fraction of respiration appeared to be requisite for growth. Inhibition of spore and mycelial respiration decreased with time.

Macmillan (W. G.), Bose (R. G.), & Bhattacharyya (J. P.). **A note on a copper tolerant Penicillium, part II—its cellulolytic activity and effect on copper-proofed hessian.**—*Sci. & Cult.*, 18, 6, pp. 287–288, 1952.

In further studies at the Microbiological Laboratory, Indian Jute Mills Association Research Institute, Calcutta, on the jute- and cellulose-decomposing ability of

a *Penicillium* sp. [*R.A.M.*, 32, p. 30], provisionally placed in the *P. janthinellum* series, and its effect on jute hessian, both unproofed and proofed with a high copper content, the material was inoculated with spores. Jute decomposition was relatively weak, amounting to 19 per cent. loss in strength of unproofed hessian compared with a 65 per cent. loss obtained with *Chaetomium indicum* [ibid., 32, p. 94]. Copper naphthenate suppressed the *Penicillium* more easily than cupramonium, thus confirming the earlier findings that the former is a better rot-proofing agent than the latter.

Harvey (J. V.). **Relationship of aquatic fungi to water pollution.**—*Sewage industr. Wastes*, 24, 9, pp. 1159–1164, 1952.

During a preliminary study of about one year (1951), more than 500 soil or water samples were collected from both polluted and non-polluted sources in areas of localized drainages in south-western Ohio for the isolation of specific groups of fungi.

Of the Saprolegniales, *Saprolegnia* and *Achlya* spp. were persistently absent from heavily polluted water and soil and only sparsely represented in partially contaminated samples. Thus, of 35 isolates of *S. ferax*, 26 occurred in non-polluted soil and 7 in uncontaminated water, the corresponding figures for 13 out of 14 isolates of *S. delica* being ten and three. All isolates of *A. flagellata* came from unpolluted sources (ten from water and one from soil), and also of *Dictyuchus* spp., *Brevilegnia diclina*, *B. subclavata*, *Pythium debaryanum*, *Geolegnia inflata*, and *G. septisporangia*. Of the 'true' water moulds, only a species of *Aphanomyces* showed some predilection for polluted water, being present in 20 such samples. Among other fungi isolated were *P. ultimum*, *P. toruloides* [? *P. torulosum*] (both from non-polluted areas), *Allomyces* sp. (polluted), and species of *Cephalosporium*, *Trichoderma*, and *Geotrichum* from sources of questionable purity.

Webb (V. M.). **Mildew growths on building surfaces.**—*Build. Top.*, 5, 3, pp. 12–14, 1951. [Abs. in *Build Sci. Abstr.*, 24, 6, p. 169, 1951. Received December, 1952.]

The growth of [unspecified] mildews and moulds on walls and other structural surfaces [cf. *R.A.M.*, 32, p. 95] may be largely prevented by the use of chlorinated rubber or PVC [polyvinylchloride] coatings after application of a fungicidal wash, e.g., 1 per cent. sodium pentachlorophenate or salicylanilide sodium salt. Wherever practicable, however, the conditions favouring mould growth should be rectified, especially in a stagnant atmosphere where little daylight penetrates.

Wikén (T.) & Somm (H.). **Atmungsversuche mit submersem Schüttelmyzel des Wurzelpilzes Mycelium radicis atrovirens in der Apparatur nach Euler, Myrbäck und Nilsson.** [Respiration experiments with submerged shake mycelium of the mycorrhiza *Mycelium radicis atrovirens* in the apparatus of Euler, Myrbäck, and Nilsson.]—*Experientia*, 8, 4, p. 140, 1952. [English summary.]

At the Institute of Agricultural Bacteriology, Zürich, the oxygen uptake of two strains of *Mycelium radicis atrovirens* in submerged shake cultures [*R.A.M.*, 31, p. 292] was determined volumetrically in the Euler respirometer (R. Nilsson, Die Methoden der Fermentforschung, 3, p. 2150, 1941). The oxygen consumption of the growing mycelium in a glucose-ammonium tartrate medium amounted to about 2×10^{-2} ml. per mg. dry weight per hour. The respiratory activity of the washed mycelium in distilled water or phosphate buffer was equivalent to that of the intact mycelium in the culture medium. This high autorespiration (endogenous respiration) was reduced by starvation for 48 hours in phosphate buffer under aerated conditions to $0{\cdot}1$ to $0{\cdot}3 \times 10^{-2}$ ml. per mg. dry weight per hour, as compared with $0{\cdot}6$ to $1{\cdot}7 \times 10^{-2}$ ml. in glucose, succinate, fumarate, and citrate solutions.

Johnson (T. W.) & Halpin (J. E.). **Influence of light on the morphology and production of conidia in some species of Dematiaceae.**—Abs. in *Phytopathology*, 42, 6, p. 342, 1952.

Sporulation by *Helminthosporium sativum* and *Curvularia lunata* begins 38 to 49 hours earlier in colonies exposed to continuous light of 50, 100, 200, 500 and 1,000 foot-candles than in those incubated in darkness. For *Alternaria solani* conidial numbers at low light intensities are comparable to those for darkness, whereas light of 200 foot-candles or upwards inhibits conidial production. Continuous exposure of *Piricularia oryzae* to the above-mentioned light intensities increases the number of conidia. All the species tested gave maximum conidial production at 200 or 500 foot-candles on six different media. Regardless of the substratum, the conidia of *A. solani* and *P. oryzae* become progressively more slender and elongated with increasing light intensity.

Goto (K.). **Sclerotium rolfsii Sacc. in perfect stage. VII. Germination of basidiospores.**—*Ann. phytopath. Soc. Japan*, 16, 3–4, pp. 132–136, 1952.

The basidiospores of *Sclerotium rolfsii* in the perfect [*Corticium*] state [*R.A.M.*, 17, p. 557; 26, p. 415] germinate fairly well on soil and onion decoction agar but very scantily or not at all on plain agar. They germinate over a pH range of 2·2 to 5·2, with an optimum at 4·6, and remain viable for two to three days at 31° C. and for 10 at 24° to 25°. The temperature range for germination is 16° to 37° with an optimum at or slightly above 28°, the optimum for germ-tube elongation being 34°.

Nitrate nitrogen checks leaf roll of Potatoes in Florida experiment.—*Crops & Soils*, 3, 9, p. 34, 1951. [Received January, 1953.]

G. M. Volk and N. Gammon, working at the Florida Agricultural Experiment Station, found that potato leaf roll virus on sandy, acid soils was reduced by increasing the supply of nitrate nitrogen [cf. *R.A.M.*, 31, p. 571]. In trials at Hastings 5–6–6 fertilizer was applied at a constant rate of 2,500 lb. per acre, but on one set of plots nitrogen was applied as ammonium and on another as a mixture of 2 per cent. nitrate and 3 per cent. ammonium and organic nitrogen. Leaf roll developed on plots receiving no nitrate, whereas those receiving the nitrogen mixture were free from the disease and their yield was 46 per cent. greater. It is suggested that where leaf roll has been prevalent farmers should maintain the soil at pH 5·3 to 5·5 and apply a fertilizer containing approximately one-third nitrate with side-dressings of the same after heavy, leaching rains.

De Bruyn (Helena L. G.). **Pathogenic differentiation in Phytophthora infestans (Mont.) De Bary.**—*Phytopath. Z.*, 18, 3, pp. 339–359, 4 figs., 1951.

The author explains the methods and describes the results of experiments at the Phytopathological Laboratory, Wageningen, Holland, from 1946 onwards demonstrating the extreme plasticity of *Phytophthora infestans* [see next abstract], reference to which has already been made [*R.A.M.*, 29, p. 379].

Six of the 12 isolates used were from the foliage of potato varieties cultivated in Holland and corresponded to Müller's race A [ibid., 13, p. 259 *et passim*], two were from W-varieties and may have been identical with race S [ibid., 29, p. 638], and four (supplied by C. Mastenbroek) came from new hybrids at a Dutch plant breeding station. In a thesis (still in the press at the time of writing) Mastenbroek distinguishes a number of Dutch races of *P. infestans* by letters, E,P,Q,R,S,T all belonging to (Netherlands)1, which agrees with Müller's race A; (N)1 is adopted in this paper. The two W-variety isolates (D and F) are termed (N)2 and the four from the new hybrids (G,H,K,I) (N)4, (N)5, (N)6, and (N)7, respectively. All isolations and reisolations were made from single zoospores. All inoculations were made with zoospore suspensions sprayed on to the foliage or inserted into wounds in the tubers.

Inoculations on tomatoes with original isolate F in June resulted in infection on Marglobe only, but in October both Vahle Leader and Marglobe became infected, and in November all ten test varieties. Inoculations in October with F after two passages through tomato also resulted in infections of the ten test varieties. These results indicate that besides a change in the parasite as a result of passages through a particular host, environmental conditions also exerted a great influence on the susceptibility of a host. There is a gradual change of infective capacity of the potato isolates towards tomatoes and newly gained characters may be lost after a change back to potato; when grown on potato no change takes place.

As a result of passages of the fungus through tomatoes and three potato hybrids, five groups of races were differentiated, comprising (1) the original 12 isolates, (2) seven of the same after passages through tomatoes, (3) five of these after final passages through Aquila and other W-varieties, (4) four of these after final passages through potato hybrid 12895, and (5) four after final passages through potato hybrid 13018. The pathogenicity of the modified isolates invariably depended on the final passages, irrespective of their origin or previous treatment. Thus, two isolates of race (N)1, after passage through the W-varieties, behaved like race (N)2 and were able to attack the previously immune W-varieties Aquila, Erika, Frühnudel, and Robusta. Hybrid 12895 appeared to possess the same resistant qualities as the W-varieties, since all the isolates passing through it assumed the characters of race (N)2. On the other hand, the position of hybrid 13018 is anomalous, the isolates traversing it being somewhat different from those of either race. New races [ibid., 31, p. 349] could also be distinguished, e.g., an isolate of race (N)1 behaved as a tomato race in group (2), acquired the characters of race (N)2 in groups (3) and (4), and in group (5) developed yet other features suggestive of a new race. Such changes occur gradually during passage through resistant plants and are possible only at times of occasional susceptibility, induced perhaps by environmental modifications. The modification of the fungus whereby it is enabled to infect plants formerly resistant may be regarded as adaptation to a new host and the appearance of adapted races probably plays an important part in nature. No correlation could be established between the foliage and tuber reactions of potatoes to the changed forms of the fungus; on the whole the tubers were more susceptible than the leaves in inoculation experiments.

For the plant-breeder the plasticity of the fungus presents a difficult problem. As new races of the fungus occur only when hybrids are cultivated it is unlikely that they will have any appreciable influence on the occurrence of blight on common potato varieties in the field, since no difference in severity of attack is apparent between the original and new races. It is thought that true immune hybrids may eventually be produced.

It is concluded from the outcome of these studies that the present segregation of *P. infestans* into physiologic races can scarcely be maintained.

Stevenson (F. J.), Schultz (E. S.), Akeley (R. V.), & Cash (L[illian] C.). **Late blight immunity in the Potato.**—*Phytopathology*, 42, 5, pp. 277–280, 1952.

Among the factors contributing to the intricacy of the problem of securing immunity from blight (*Phytophthora infestans*) in the potato are the apparent lack of this reaction in cultivated varieties and its existence in wild species of *Solanum* with no valuable horticultural features; the intervention of multiple genes in the inheritance of immunity from all physiologic races of the fungus [*R.A.M.*, 31, p. 626]; the instability of varietal reactions caused by environmental factors; and the development of a multiplicity of physiologic races [see preceding abstract].

The present phase of the joint investigations on breeding for immunity of the United States Department of Agriculture and the Maine Agricultural Experiment Station is concerned with the use of seedlings from crosses and back-crosses between

the immune *S. demissum* and cultivated varieties in such a way as to recombine the several immunity genes carried by the former and so produce commercial types capable of withstanding all the known physiologic races of the pathogen. For example, a cross between TI_5 (one of D. Reddick's seedlings, five generations removed from *S. demissum* [ibid., 13, p. 652]), which is immune from the common races and at least three of the more virulent, and B355–24, immune from the ordinary races of *P. infestans* and resistant to ring rot [*Corynebacterium sepedonicum*: ibid., 30, p. 533], gave rise to 337 seedlings; of these, 23 were selected for commercial possibilities and tested for their reaction to blight in the field. The aerial systems of 11 appeared immune and the inoculation of their tubers with spores of the fungus gave negative results. Five of these escaped infection when inoculated with spores of six virulent cultures at Beltsville, Maryland. President, which is moderately resistant to the common races [ibid., 17, p. 482; 31, p. 78], sustained heavy damage from all the cultures, while Kennebec, apparently immune from the ordinary races [ibid., 32, p. 97 and next abstract], was attacked by four of the six used in the test. The five seemingly immune selections were sent to Cornell University for testing with L. C. Peterson's races B, C, D, BC, and BD [ibid., 31, p. 349]. Three proved to be immune from B, C, D, and BD, but not from BC, their behaviour in this respect being identical with that of the TI_5 parent, while the other two were not attacked by any of the races. One of the seedlings that withstood infection by both the Maryland and Cornell cultures shows commercial promise and is undergoing tests for yield, culinary quality, and other important characters.

Schultz (E. S.). **Powdery scab, a precursor for the late blight infection of blight-immune Potato tubers.**—Abs. in *Phytopathology*, 42, 6, p. 343, 1952.

During an epiphytotic of potato blight (*Phytophthora infestans*) in Maine in 1951, tubers of the normally immune Kennebec variety [see preceding abstract] contracted the disease in soil infested by *Spongospora subterranea*. The blighted areas were closely associated with the powdery scab lesions, which apparently served as points of entry for *P. infestans*. In one field at harvest time about 30 per cent. of the tubers with powdery scab were also attacked by blight, which was absent from clean tubers. Evidently the non-suberized sori of *S. subterranea* function similarly to injuries in paving the way for invasion by *P. infestans* in blight-immune tubers.

Zakopal (J.). **Výsledky zkoušek na vzdornost k rakovině Bramborů.** [The results of tests for resistance to Potato wart.]—*Ochr. Rost.* [*Plant Prot., Prague*], 23, 3, pp. 210–215, 1950. [Russian and English summaries.]

In the 1949 trials, conducted by the Research Institute for Plant Protection, Brno, Czechoslovakia, for resistance to potato wart disease (*Synchytrium endobioticum*) [*R.A.M.*, 30, pp. 70, 538; 32, p. 147, and next abstract] on heavily infested land at Velké Karlovce the following varieties were resistant: Keřk. ledvinky, Kitting, Viš. rohlíčky, Krasava, Kardinál, Květuše, Keř. rohlíčky, Reneta, Dagmar, Draga, Flora, Norma, Radan, Voran, Triumph, Carmen, Dolar, Táborky, Bojar, Figna, Kotonov, Ackersegen, and Karat from Czechoslovakia; Stormont Dawn, Home Guard, Redskin, Arran Cairo, Record, Defiance, Arran Consul, and Arran Banner from Great Britain; Pierwrosnek, Dar, Oka, Pionier, Warszawianka, Bela, Karmazin, Wisla, Baltyk, Lenino, R 921, Narvik, Žolčiak, Rubin, Bem, and Hel from Poland; Kaměras 1 and 2 from the U.S.S.R.; Houma from the United States; and Herald, Magneto, Söda Kartul, Consum, Early Rose, Hasia Praha, and Bintje Praha from elsewhere. Ostbote (unknown origin) and Parnassia (from Czechoslovakia) were immune.

The author considers that laboratory tests indicating different biotypes of *S. endobioticum* [ibid., 31, p. 573] are unreliable and should be supplemented by comparative field tests in various localities.

Zakopal (J.). **Možnosť desinfekce půdy proti rakovine Bramborů Synchytrium endobioticum (Schilb.) Perc. přípravkem obsahujícím 2-4 dinitroorthokresol.** [The possibility of soil disinfection against Potato wart disease, *Synchytrium endobioticum* (Schilb.) Perc., with a preparation containing 2-4 dinitro-orthocresol.]—*Sborn. čsl. Akad. Zeměd.* [*Ann. Acad. tchécosl. Agric.*], 23, 1–2, pp. 132–141, 1950. [Abs. in *Biol. Abstr.*, 26, 4, p. 941, 1952.]

In work at the Plant Pathological and Protection Research Institute, Brno, Czechoslovakia, potato plots infected with *Synchytrium endobioticum* [see preceding abstract] were treated with nitrosan (a 25 per cent. sodium salt of DNC) applied at the rate of 10 l. per sq. m. At 2 per cent. the product completely controlled infection and was not phytotoxic. At lower concentrations the material was wholly or partly ineffective and at higher ones injurious.

Richter (H.) & Schneider (R.). **Untersuchungen zur Rhizoctonia. Anfälligkeit der Kartoffelsorten.** [Studies on *Rhizoctonia*. The susceptibility of Potato varieties.]—*Züchter*, 20, 9–10, pp. 257–267, 6 figs., 2 graphs, 1950.

All the potato varieties tested at the Biological Institute, Berlin-Dahlem, for their reaction to three virulent strains of *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 31, p. 454, and next abstract] proved to be more or less susceptible when sprouts that had been kept in the dark were rooted in moist sand, inoculated at the base, middle, and tip with mycelial fragments from beer wort cultures, and then placed under bell jars lined with damp filter paper in darkness at a temperature of 20° C. Only in a few instances did the results of laboratory experiments agree with those in the field in two localities, Prisca and Frühbote, for instance, being severely attacked under both conditions.

Richter (H.) & Schneider (R.). **Rhizoctonia-Schäden an Stolonen, Wurzeln und Knollenanlagen der Kartoffel.** [*Rhizoctonia* injuries on Potato stolons, roots, and tuber sprouts.]—*Phytopath. Z.*, 17, 4, pp. 374–383, 5 figs., 2 graphs, 1951. [Received 1952.]

At the Division of Mycology, Biological Central Institute, Berlin-Dahlem, an inoculation experiment was performed on disinfected tubers of three potato varieties and a selection, No. 41.8.16, to determine the extent of the damage inflicted by *Rhizoctonia* [*Corticium*] *solani* [see preceding abstract]. The tubers were planted on 5th May, 1950, and the effect of the pathogen on emergence was assessed at three inspections, on 5th and 15th June and 3rd July. Ackersegen, Aquila, and No. 41.8.16 sustained a heavy initial set-back which was apparent on the earliest date, but these effects were rapidly effaced as growth proceeded and could no longer be perceived at the onset of flowering [cf. *R.A.M.*, 23, p. 405].

Damage to the subterranean organs was evaluated on two lifting dates, 31st July and 19th August. It was most extensive on the stolons [ibid., 27, p. 335], especially of Gemma, in which the loss amounted to 72 per cent. The root system was much less severely injured and the effect of the fungus on the foliage was inconsiderable. There was a high percentage of bud infections on the stolons, involving primary attacks on the growing point, and the tuber meristems frequently suffered damage which was reflected at maturity in various anomalies, such as excrescences, constrictions, stunting, depressions, and abnormal roughening of the skin.

Chattopadhyaya (S. B.). **A short note on the Potato spraying operations in the plains of west Bengal in the year 1950–51.**—*Plant Prot. Bull., New Delhi*, 4, 1, pp. 7–8, 1952.

High day (80° to 95° F.) and low night (55° to 60°) temperatures with prolonged fogs early in the morning and the lateness of the season were highly favourable

to the development of potato early blight [*Alternaria solani*: *R.A.M.*, 32, p. 146] in west Bengal in 1950–1. Timely single or, when necessary, double sprayings with perenox (4 lb. per 100 gals. water) in January and February, over an area of 19,542 acres, however, prevented the spread of the disease and resulted in an estimated increase in yield of 7,200 tons.

Bortels (H.). **Fortgeführte Untersuchungen über die Beziehung zwischen Infektionserfolg und Wetterverlauf bei der Kartoffel-Nassfäule. Vorläufige Mitteilung.** [Further studies on the relation between the establishment of infection and the course of the weather in Potato wet rot. Preliminary note.]—*Phytopath. Z.*, 18, 3, pp. 360–362, 1 graph, 1951. [Received 1952.]

In further experiments at the Brunswick branch of the Biological Institute to determine the relations between meteorobiological factors and the epidemiology of potato wet rot and black leg (*Bacterium phytophthorum*) [strain of *Erwinia carotovora*: *R.A.M.*, 29, p. 13; cf. also ibid., 31, p. 134], bouillon agar cultures in inoculation tests on Direktor Johanssen tubers were again more virulent at high than at low barometric pressure. The position was reversed, however, in the case of cultures partially shielded from the 'T' (deep or soft) rays operative in low-pressure areas [ibid., 29, p. 326] by sheets of aluminium foil 0·7 mm. in thickness or maintained in potato juice instead of on agar. These anomalies are attributed in part to the incompletely anaerobic nature of the pathogen.

Löhnis (Marie P.). **Injury due to excess of manganese to Potatoes.**—*Tijdschr. PlZiekt.*, 58, 6, pp. 215–219, 4 figs., 1952.

Potatoes grown in acid soils at the Laboratory for Microbiology, Wageningen, Holland, suffer from an excess of manganese [cf. van Schreven: *R.A.M.*, 18, p. 545] which, coupled with a decreasing availability of magnesium, induced symptoms resembling those described by Berger & Gerloff [ibid., 27, p. 40] from Wisconsin under the name of 'stem streak necrosis' [ibid., 29, p. 474]. The disorder induced by magnesium deficiency is known as the 'Noordeling phenomenon' because of its prevalence in that variety [ibid., 28, p. 620]. Evidence was obtained that magnesium may influence manganese uptake and the beneficial effects of soil amendments of magnesium sulphate in acid soils may be due to the correction of magnesium deficiency or reduction of injury due to excess manganese.

Adyanthaya (N. R.) & Rangaswami (G.). **Distribution of silica in relation to resistance to 'blast' disease in Rice.** –*Madras agric. J.*, 39, 3, pp. 198–204, 1 pl., 1952.

In studies at the Agricultural Research Institute, Coimbatore, on the distribution of silica in rice leaves in relation to varietal reaction to blast (*Piricularia oryzae*) [*R.A.M.*, 31, p. 205], the principal disease of the crop in Madras [ibid., 10, p. 337, and above, p. 176], the largest numbers of silicated epidermal long and bulliform cells occurred in Co.4 and Co.26, the two most resistant of 20 varieties, the means per unit area at 30 days old being 19·95 and 18·5, respectively, compared with 3·95, 3·9, and 3·75 in Co.20, Adt.10, and Co.10, respectively. Increasing ammonium sulphate (80 and 120 lb. as against 40 lb. per acre) [cf. ibid., 31, p. 399] tended to reduce the number of silicated cells in both resistant and susceptible varieties [see next abstract].

Krishnaswami (C. S.). **Influence of nitrogen, phosphorus and potash on the incidence of blast disease of Rice.**—*Madras agric. J.*, 39, 3, pp. 205–214, 1952.

In a series of field experiments at the Agricultural Research Institute, Coimbatore, heavy soil amendments of nitrogen, whether as ammonium sulphate or groundnut cake, increased the incidence of blast (*Piricularia oryzae*) in the susceptible

Adt.10 variety [see preceding abstract]. Potassium sulphate and superphosphate, either alone or in combination with nitrogen, did not appear to exert any appreciable effect on the course of the disease [cf. *R.A.M.*, 31, p. 457].

Kamat (M. N.) & Patel (M. K.). **Notes on two important plant diseases in Bombay State.**—*Plant Prot. Bull., New Delhi*, 3, 1, p. 16, 1951. [Received October, 1952.]

Ephelis oryzae [*R.A.M.*, 27, p. 379], present on rice in the Bombay State since 1920, is reported to be steadily increasing in intensity, the disease incidence in the experimental area in North Kanara averaging 9 to 11 per cent. Banana bunchy top virus [ibid., 20, pp. 244, 447], recently recorded in this State, is spreading rapidly to Khandesh, Poona, and Surat, the important banana growing centres, the disease incidence there varying from 25 to 70, 10 to 15, and 25 to 30 per cent., respectively. The State Governments have been approached with a view to establishing a joint scheme for quarantine measures, roguing, and eradication of the disease.

Loeb (Josephine R.) & Mayne (Ruth W.). **Effect of moisture on the microflora and formation of free fatty acids in Rice bran.**—*Cereal Chem.*, 29, 3, pp. 163–175, 1952.

At the Southern Regional Research Laboratory, New Orleans, Louisiana, the factors influencing the deterioration of rice bran during storage were investigated. Moulds and filamentous yeasts multiplied heavily at 75·5 and 80·3 per cent. relative humidities (corresponding to an initial moisture content of 13·7 per cent.). *Mucor* sp. and *Aspergillus flavus-oryzae* (group) predominated at first, but by the tenth day they were overrun by *A. chevalieri*. At 93·1 and 100 per cent. (moisture contents 21·3 to 26·4 and 29·8 to 33·5 per cent., respectively), another *M.* sp. and *Rhizopus* sp. preponderated.

Barnet (G. W. D.). **Mechanical felling of Rubber trees.**—*Adv. Circ. Rubb. Res. Inst. Ceylon* 33, 6 pp., 3 figs., 1952.

Most of this information on the mechanical felling of old rubber trees at Dartonfield, Ceylon, using the Trewhella monkey grubber, and the advantages of the method in the eradication of *Fomes lignosus* has already been noticed from another source [*R.A.M.*, 31, p. 629].

Marudarajan (D.). **'Koleroga' or 'Mahali' disease of Arecanuts.**—*Plant Prot. Bull., New Delhi*, 3, 4, pp. 117–118, 1951. [Received October 1952.]

In certain years the areca nut koleroga disease [*Phytophthora arecae*: *R.A.M.*, 30, p. 180] causes heavy losses of areca crops which cover a total area of 100,000 acres in the Malabar and South Kanara districts of India. Detailed experiments at Mundaji, a village in South Kanara, have shown that 1 per cent. Bordeaux mixture spray, applied just before the monsoon and once again about six weeks later, was quite sufficient for controlling the disease, added adhesive being unnecessary. The 'jet' spray method was just as effective as the 'mist' spray. A plant protection staff in these districts helps the farmer to carry out the control measures.

Chevalier (A.). **Les mesures à prendre pour réagir contre la décadence de la culture du Poivrier en Indochine (au Cambodge et dans la Cochinchine austro-occidentale).** [Measures to be taken for combating the deterioration of Pepper cultivation in Indo-China (in Cambodia and south-west Cochin-China).]—*C. R. Acad. Sci., Paris*, 235, 18, pp. 993–995, 1952.

Up to 1939 the cultivation of pepper (*Piper nigrum*) in Cambodia and the neighbouring regions of Indo-China was flourishing, 3,500 to 5,000 tons being exported

annually to France, but to-day production is at a low ebb in consequence of a widespread die-back which reached a climax in 1945. H. Barat has reported unsuccessful attempts to improve the condition of the stands by means of soil amendments to counteract acidity, disinfection with Bordeaux mixture, and fungicidal treatment of the plants against soil fungi (species of *Fusarium*, *Phytophthora*, *Nectria*, *Pythium*, *Botryodiplodia*, and *Glomerella*). A mottling of the leaves and stems, probably of virus origin, and a bacterial disease have also been observed, reducing yields in some localities by over 50 per cent. An experiment station was established at Kep in 1948, but so far little headway has been made in the campaign against degeneration.

The cultivation of pepper involves very special methods of maintenance, including regular renewal of the plantations with amendments of virgin soil, mould with a high potassium content, and a manure of ground shrimp shells. Without this treatment a plantation may become exhausted after 20 years, and it is suggested that the above-mentioned materials contain trace elements essential to the well-being of the crop [see next abstract].

Bertrand (G.). **À propos de la lutte contre la décadence des cultures de Poivrier en Indochine et en Extrême-Orient.** [Concerning the control of degeneration in the Pepper cultures of Indo-China and the Far East.]—*C. R. Acad. Sci., Paris*, 235, 21, pp. 1262–1263, 1952.

From Chevalier's description of the symptoms of degeneration in the pepper plantations of Indo-China [see preceding abstract] the author concludes that the condition is caused by trace-element deficiency.

Muzik (T. J.) & La Rue (C. D.). **The grafting of large monocotyledonous plants.**—*Science*, 116, 3022, pp. 589–591, 1 fig., 1952.

The authors report the successful grafting of sugar-cane and three other monocotyledons by appropriate manipulation of the intercalary meristem just above the node. Only about 3 per cent. of the grafts took.

Abbott (E. V.). **Stability of strains of Sugarcane mosaic virus.**—Abs. in *Phytopathology*, 42, 5, p. 281, 1952.

For 15 years strains A, B, and D of sugar-cane mosaic virus [*R.A.M.*, 28, p. 309; 31, p. 352] have been carried as stock cultures [? at the United States Sugar Plant Field Station, Houma, Louisiana: cf. next abstract] on the clones P.O.J.234, Co.281, and Louisiana Purple, which react identically to infection, without change in the characteristic symptoms resulting on transference to the differential host, C.P.31/294. Strain C, which induces distinctive symptoms, also remained stable. Strains A, B, and C have been carried for over a year on C.P.31/294 without apparent alteration in symptoms, but after three to six months the discrete, elongated, yellowish-white lesions commonly produced by D are gradually replaced by the mild mottling associated with A. When sap from plants exhibiting this change was inoculated [cf. ibid., 29, p. 121] into healthy C.P. 31/294, only strain A symptoms developed.

Azab (Y. E.) & Chilton (S. J. P.). **Transmission of mosaic resistance to progenies in crosses between certain Sugarcane varieties.**—Abs. in *Phytopathology*, 42, 5, p. 282, 1952.

Studies on the inheritance of resistance to sugar-cane mosaic virus [in Louisiana: cf. preceding abstract] involved the inoculation in the greenhouse of 71,769 seedlings from 175 crosses between different varieties. The inoculum consisted of sap from infected Co.290 plants and 220-mesh carborundum was used as an abrasive.

All types of crosses gave rise to both resistant and susceptible plants. The percentages showing mosaic symptoms in the progeny of crosses between resistant and resistant, susceptible and susceptible, and resistant and susceptible parents ranged from 0 to 87·7, 2·6 to 35·6, and 0·8 to 94·5, respectively. It is postulated that inheritance of resistance to sugar-cane mosaic is conditioned by complementary factors, resistance being dominant and a group of minor modifying genes controlling the expression of the disease. Irregularities in the behaviour of *Saccharum spontaneum* chromosomes during meiosis in sugar-cane varieties also influence the transmission of resistance.

Azab (Y. E.) & Chilton (S. J. P.). **Studies on inheritance of resistance to red rot disease of Sugarcane.**—Abs. in *Phytopathology*, 42, 5, p. 282, 1952.

For a period of two years the reactions to *Physalospora tucumanensis* of the progenies of 14 sugar-cane crosses, involving resistant × resistant, resistant × susceptible, and susceptible × susceptible parents, were studied [in Louisiana: *R.A.M.*, 31, pp. 298, 300]. The condition, after two to three months' burial, of stalks inoculated with a spore suspension of the fungus led to the assumption that resistance is governed by one or a few genes for resistance from *Saccharum spontaneum* and a dominant gene from *S. officinarum* which inhibits them. The reaction of the plants is further affected by a group of modifying factors. The irregular chromosomal behaviour in sugar-cane varieties during meiosis influences the ratios of resistant to susceptible offspring.

Luke (H. H.). **Fungi antagonistic to Pythium arrhenomanes isolated from Louisiana Sugarcane soils.**—Abs. in *Phytopathology*, 42, 5, p. 286, 1952.

Of 4,000 fungal isolates obtained from 46 sugar-cane soil samples in 13 localities of Louisiana during a survey initiated in December, 1950, 15·4 per cent. were shown to be antagonistic to *Pythium arrhenomanes* in pure culture [see next abstract] in the following percentages: *Penicillium* spp. 44·2, *Aspergillus* spp. 22·6, *Spicaria* spp. 22·4, and other species 10·8. Zones of inhibition less than 10 mm. in width were produced by 82 per cent. of the fungi, 11 to 15 mm. by 17 per cent., and exceeding 15 mm. by 1 per cent.

Johnson (L. F.) & Wheeler (H. E.). **The effect of actinomycetes antibiotic to Pythium arrhenomanes in plate cultures on root rot of Sugarcane and Corn.**—Abs. in *Phytopathology*, 42, 5, p. 284, 1952.

Of several hundred actinomycetes isolated from Louisiana sugar-cane soils, 37 were selected on the basis of preliminary tests for further trials against *Pythium arrhenomanes* [see preceding abstract; *R.A.M.*, 29, p. 583], the agent of sugar-cane and maize root rot [ibid., 21, p. 449; 32, p. 77]. Plate cultures of the isolates were mixed with autoclaved soil in pots, the soil was infested with the pathogen, and a week later maize seed was sown. The condition of the roots after a fortnight's growth showed the best control of the disease generally to be effected by actinomycete isolates producing a zone of inhibition in plate cultures of or exceeding 30 mm. in width. Certain isolates forming zones of 10 to 25 mm. also combated the root rot to some extent, but when the zones were narrower than 10 mm. no control was exerted.

King (N. C.). **Chlorotic streak in Natal Cane. Warning against possible infection.**—*S. Afr. Sug. J.*, 36, 7, p. 423, 1 fig., 1952.

Chlorotic streak of sugar-cane has been observed in Natal, first on a few varieties at the Experiment Station and subsequently on N.Co.310 and in one instance on Co.281. This is the first record of the disease in continental Africa [C.M.I. map No. 29].

In a later report by A. McM[ARTIN] (*S. Afr. Sug. J.*, 36, p. 639) on Experiment Station activities, chlorotic streak is stated to be widespread throughout the sugar belt.

McM[ARTIN] (A.). **Experiment Station notes. Plant food investigations: smut inspection results.**—*S. Afr. Sug. J.*, 36, 5, p. 311, 1952.

The latest inspections for sugar-cane smut [*Ustilago scitaminea*] in Natal [*R.A.M.*, 28, p. 196; 31, p. 576] revealed infection on numerous farms between Maidstone and the Tugela River. The percentages of smut in the plant and ratoon crops, respectively, of four varieties in the 469 fields inspected were as follows: Co.310, 47 and 59; N.Co.310, 2·8 and 6; Co.331, 6 and 0; and Co.281, 20 and 0. The newly released variety, N.Co.339, is expected to contract about the same incidence of smut as N.Co.310.

Hsia (Y. J.), Chuan (L. T.), & Wang (C. S.). **An appraisal of N.Co.310 Cane. Results of extensive tests on Taiwan.**—*S. Afr. Sug. J.*, 36, 5, pp. 287, 289, 291, 293, 295, 297, 299, 301; 6, pp. 349, 351, 353, 355; 7, pp. 435, 437, 439, 441, 443, 13 figs., 5 graphs, 1952.

Some of the information on disease reactions in this exhaustive, fully tabulated report of the authors' observations and experiments in Formosa on the N.Co.310 sugar-cane variety has already been noticed from another source [*R.A.M.*, 31, p. 300]. In inoculation tests with pineapple disease [*Ceratostomella paradoxa*: loc. cit.; ibid., 30, p. 543] the percentage of germination uniformly exceeded 60. The percentages of banded sclerotial disease [*Corticium sasakii*: ibid., 28, p. 142], leaf sheath red rot [*Sclerotium rolfsii*: ibid., 30, p. 344], and *Cytospora* [*sacchari*: loc. cit.] were 18·8, 6·7, and 5, respectively.

Sugarcane research in Mauritius during 1950.—*Rev. agric. Maurice*, 31, 2, pp. 83–103, 1952.

In this summary of the Twenty-first Annual Report of the Sugar-Cane Research Station, Mauritius, it is stated that by standing male arrows of sugar-cane varieties and crosses with 3 to 4 feet of stalk in aretan [*R.A.M.*, 32, p. 101] at 0·1 to 0·03 per cent. they were preserved for breeding work. The effectiveness of 1 per cent. aretan, abavit S, and agrosan GN against pineapple disease [*Ceratostomella paradoxa*: loc. cit., ibid., 31, p. 537] was confirmed in trials at the Labourdonnais, Benarès, and Ferney Sugar Estates in 1949, the average numbers of affected cuttings per plot at the three stations, respectively, being 1·5, 2·25, and 1·2 for aretan, 0, 0, and 1·4 for abavit S, and 0·25, 1·75, and 0·8 for agrosan GN compared with 200, 260, and 160 for the untreated.

Middleton (J. T.). **Generic concepts in the Pythiaceae.**—*Tijdschr. PlZiekt.*, 58, 6, pp. 226–235, 1952.

A comparative review is given of the diagnostic characters of the genera which have, from time to time, been placed in the Pythiaceae. *Pythium* [*R.A.M.*, 22, p. 373], *Phytophthora* [ibid., 10, p. 754; 28, p. 632], *Zoophagus* [ibid., 15, p. 720], and *Trachysphaera* [ibid., 2, p. 497], and doubtfully *Pythiogeton* and *Diasporangium* are retained for the present. The only features considered adequate to enable a distinction to be made between *Phytophthora* and *Pythium* are the compound sympodial sporangiophores with nodal swellings and the amphigynous antheridia of the former and the frequently filamentous or usually non-papillate nature of the sporangia of the latter. The amphigynous antheridium serves to distinguish *Phytophthora* and *Trachysphaera*, on the one hand, from *Pythium* and *Zoophagus* on the other. *Trachysphaera* differs from *Phytophthora* in having spiny vegetative

structures, while *Zoophagus* is maintained distinct from *Pythium* in possessing specialized processes for capturing aquatic animals. These features enable a clear distinction to be made between the principal genera without having recourse to the mode of sporangial germination, which is considered of doubtful value as a taxonomic feature.

Müller (E.). **Die schweizerischen Arten der Gattung Ophiobolus Riess.** [The Swiss species of the genus *Ophiobolus* Riess.]—*Ber. schweiz. bot. Ges.*, 62, pp. 307–339, 9 figs., 1952.

Three new species of *Ophiobolus* are included in this critically annotated list of 20 occurring in Switzerland.

Blumer (S.). **Beiträge zur Spezialisation der Erysiphaceen.** [Contributions to the specialization of the Erysiphaceae.]—*Ber. schweiz. bot. Ges.*, 62, pp. 384–401, 1952. [English summary.]

In further studies at the Wädenswil Research Institute, Zürich, on specialization in the Erysiphaceae [*R.A.M.*, 31, p. 148], *Erysiphe polyphaga* from cucumber was shown to be pathogenic to *Antirrhinum majus*, a cultivated species of *Myosotis*, *Scorzonera hispanica*, and *Lamium galeobdolon* [*Galeobdolon luteum*], all new hosts for the mildew, bringing the total known at present to about 100. Conversely, cucumber proved susceptible to infection by conidia of the fungus from tobacco, *Petunia hybrida*, *Kalanchoe* sp., *Cissus antarctica*, *Saintpaulia ionantha*, and *Verbena hybrida*. In spite of the wide host range pronounced specialization exists on certain species or varieties. Evidence is adduced from the relevant literature (43 titles) for the connexion between reaction to *E. polyphaga* and seasonal changes in the environment, nutritional factors, and the age of the plant [cf. ibid., 16, p. 376; 19, p. 489]. The morphological characters and host range of *E. polyphaga* are thought to be suggestive of its identity with *E. horridula* [ibid., 2, p. 180].

Terrier (C.). **Deux ascomycètes nouveaux.** [Two new ascomycetes.]—*Ber. schweiz. bot. Ges.*, 62, pp. 419–428, 2 pl., 4 graphs, 1952.

Full descriptions are given of two new foliicolous ascomycetes collected at Lausanne, Switzerland, namely, *Chloroscypha cryptomeriae* n. sp. on *Cryptomeria japonica* and *Karschia nootkatensis* n. sp. on *Chamaecyparis nootkatensis* f. *pendula*.

Dupias (G.). **À propos des Urédinées parasites des Aegilops.** [Concerning the Uredineae parasitic on *Aegilops*.]—*Ber. schweiz. bot. Ges.*, 62, pp. 370–373, 1952.

In the south-east of France the author experimentally confirmed the infection of *Aegilops ovata* by *Puccinia triticina* [*R.A.M.*, 12, p. 499] and *P. dispersa* [ibid., 31, p. 376], and also found it serving as an aecidial host of *P. clematidis-secalis* [ibid., 28, p. 569].

Viennot-Bourgin (G.). **Urédinales d'Afrique (2e note). Urédinales de la Côte d'Ivoire (1re note).** [Uredinales of Africa (2nd note). Uredinales from the Ivory Coast (1st note).]—*Bull. Soc. mycol. Fr.*, 67 (*1951*), 4, pp. 429–435, 1952.

In a further contribution to this series [cf. *R.A.M.*, 30, p. 432] descriptions are given of 12 new species belonging to seven genera of Uredinales collected in the Ivory Coast from July to September, 1951.

Plant pathology department.—*Rep. Tocklai Exp. Sta. Indian Tea Ass., 1950*, pp. 23–39, 1951.

In this report [cf. *R.A.M.*, 30, p. 196, and next abstract] E. Hainsworth records that experiments confirmed the benefit of a spray consisting of 1 per cent. Burgundy mixture and 0·1 per cent. zinc sulphate in increasing seed crops when applied to flowering tea bushes badly affected by *Sclerotinia* disease. The fluid

causes crop reduction, however, when applied to high-yielding bushes that are not badly affected.

R. I. MacAlpine reports that black rot (*Corticium invisum*) [loc. cit.] was identified in two gardens in the Darjeeling Hills during the year. Diseased tea bushes from the Darjeeling and Terai areas yielded primarily the charcoal stump rot organism (*Ustulina zonata*); *Fomes lamaensis* [? *F. noxius*], the agent of brown root rot, also appeared fairly frequently. *Rosellinia arcuata*, causing black root rot, was identified in specimens from the Tista valley.

Plant pathological department.—*Rep. Tocklai Exp. Sta. Indian Tea Ass., 1951*, pp. 14–23, [? 1952].

In this report [see preceding abstract] the results are given of a series of experiments on the Meleng Tea Estate initiated to determine whether there is a critical stage in the life-cycle of the black rot fungus (*Corticium invisum*) [loc. cit.], during which it can be killed by spraying with a standard copper fungicide. In 1951 this stage appeared to be from early April to the end of May, and disease incidence was reduced appreciably by two fortnightly spraying rounds during this period, the effect being almost equal to that following spraying in the growing season. Similar results were obtained in a garden in Upper Assam and in the Dooars. During the cold season of 1951 five winter sprays were compared with two spring ones on the Katonibari Tea Estate for control of *C. invisum*. One application of perenox 0·25 per cent. plus sandovit in late April gave the best control with only 14 per cent. bushes affected as against 64 per cent. for the unsprayed. Six copper fungicides at various concentrations were applied to black-rot-infected branches in the third week of April. Two applications of a 0·25 per cent. solution during the crucial period at an interval of about two weeks appeared to be more beneficial than one at a higher concentration. It is considered that thorough and complete coverage can be obtained only by more than one application, otherwise fungus growth is resumed from the unsprayed parts.

Attacks of blister blight [*Exobasidium vexans*: *R.A.M.*, 32, p. 150] persisted from the autumn throughout the winter period in all districts, especially under heavy shade or alongside jungles. The disease was particularly severe on tea which had been manured late the previous season, and was favoured by the damp, warm weather during November and December, 1950, being arrested only by the long spring drought.

Tea bushes previously killed by injections of Atlas Tree Killer and then inoculated with *Ustulina zonata*, *Poria hypolateritia* [ibid., 30, p. 82], *Fomes lamaensis* [? *F. noxius*], and *Aglaospora* sp. were uprooted and examined after six and ten months. The spread of these fungi was more rapid in the roots of poisoned bushes than in living ones. *U. zonata* was found alive in the wood of bushes injected with the poison at a distance of 1 in. radially from the injection puncture.

Nusbaum (C. J.). **Host-parasite relations of Phytophthora parasitica var. nicotianae in roots of resistant and susceptible Tobacco varieties.**—Abs. in *Phytopathology*, 42, 5, p. 286, 1952.

Cytological studies of black shank (*Phytophthora parasitica* var. *nicotianae*) infections in roots of susceptible (402) and resistant (Dixie Bright 101 and 102) tobacco varieties in North Carolina [*R.A.M.*, 31, p. 461, and next abstract] were carried out after inoculation with zoospore suspensions of the fungus. Zoospore germination and direct penetration of the outer layer occur within three hours. The cortical tissues of young roots of variety 402 are invaded both inter- and intracellularly by the mycelium, the stele being reached within six hours. All the tissues become involved at a later stage, tyloses being formed in the xylem elements. In the roots of resistant varieties the cell entered by the infection hypha and the

adjacent cells collapse. The mycelium develops sparsely in the tissues killed in advance of the invading hyphae. Infection is mostly limited to the cortex, but if it should extend to the stele the further course of the rot is similar to that in susceptible varieties.

Nusbaum (C. J.), Lucas (G. B.), & Chaplin (J. F.). **Estimating the inoculum potential of Phytophthora parasitica var. nicotianae in the soil.**—Abs. in *Phytopathology*, 42, 5, p. 286, 1952.

In field evaluations of tobacco breeding stocks for resistance to black shank, critical levels of infestation by *Phytophthora parasitica* var. *nicotianae* are essential for the elimination of susceptible plants. Observations in North Carolina [see preceding abstract] indicate that the infestation level may vary widely from one field to another or even in different parts of the same field. Various laboratory and greenhouse methods for the quantitative estimation of inoculum potential were explored, and in preliminary tests it was found that certain naturally infested soils, diluted 1 to 100 or higher with steamed sand, contain sufficient toxic material to infect and kill susceptible plants in 20 days. The top dilution at which there is no plant survival within that period and the rate at which plants die at this dilution are used to compute the inoculum potential.

Valleau (W. D.). **Breeding Tobacco for immunity to black shank.**—Abs. in *Phytopathology*, 42, 5, p. 288, 1952.

The factor conferring immunity from black shank (*Phytophthora parasitica* var. *nicotianae*) [see preceding abstracts] in *N*[*icotiana*] *longiflora* is completely dominant in the $F_1 \times$ T[obacco] and T $\times$ L[ongiflora]. The first back-cross to tobacco in current hybridization experiments [in Kentucky] to improve the present insufficient measure of varietal resistance is sometimes completely immune, while the second produces a few immune tobacco-like plants. It should be easy to combine resistance to other tobacco diseases by using a back-cross parent resistant to them in each generation, provided the black shank immunity factor can eventually be stabilized in a tobacco chromosome. The exclusion of susceptible plants from a back-cross can be effected by the inoculation of seedlings a few days old or vigorous, young transplants with zoospores of *P. parasitica* var. *nicotianae*. Transplants developing leaf spots in about 48 hours can be discarded, while slow-growing, susceptible plants that escape can be eliminated in 48 to 72 hours by placing a leaf of each in distilled water containing zoospores. Susceptible leaves begin to decay in 40 to 60 hours, while those from immune plants are unaffected.

Woolley (D. W.), Pringle (R. B.), & Braun (A. C.). **Isolation of the phytopathogenic toxin of Pseudomonas tabaci, an antagonist of methionine.**—*J. biol. Chem.*, 197, 1, pp. 409–417, 1952.

The procedure developed at the Rockefeller Institute for Medical Research, New York, for the assay of the phytopathogenic toxin elaborated by *Pseudomonas tabaci*, the agent of tobacco wildfire [*R.A.M.*, 29, p. 586, and next abstract], is fully described. Of the pure substance only 0·05γ was required to produce a lesion on a tobacco leaf. The toxin was quite unstable, especially above neutrality, and analytical findings indicated that it was an α-amino acid. Hydrolysis with 6N hydrochloric acid yielded a new ninhydrin-positive substance which appeared to be a hitherto unrecognized amino acid [see next abstract].

Woolley (D. W.), Schaffner (G.), & Braun (A. C.). **Isolation and determination of structure of a new amino acid contained within the toxin of Pseudomonas tabaci.**—*J. biol. Chem.*, 198, 2, pp. 807–813, 1 diag., 1952.

The new amino acid derived from the phytopathogenic toxin of *Pseudomonas*

tabaci [see preceding abstract] is designated tabtoxinine. Its composition and structure are discussed.

COMMONER (B.) & DIETZ (PHYLLIS M.). **Changes in non-protein nitrogen metabolism during Tobacco mosaic biosynthesis.**—*J. gen. Physiol.*, 35, 6, pp. 847–856, 4 graphs, 1952.

In further studies on tobacco mosaic virus biosynthesis at the Henry Shaw School of Botany, Washington University, St. Louis, Missouri [*R.A.M.*, 30, p. 547], disks of infected tobacco leaf tissue were found to contain less non-protein nitrogen than comparable uninfected material during the process of virus formation. Disks cultured in Vickery's nutrient solution (*Bull. Conn. agric. Exp. Sta.* 399, 1937) at half strength produce more virus (55 μmg. per 100 mg. leaf tissue) than those in distilled water (30 μgm.). The maximum non-protein nitrogen deficiency corresponds approximately with the amount of virus synthesized.

The greatest difference between infected and uninfected tissue occurred in the ammonia content, and smaller but significant ones in the amide content. Infected disks cultured in water did not differ appreciably in free amino acid content from the controls, while those in the nutrient solution developed a small deficiency.

The general patterns of change in composition of the pool of soluble nitrogen in the leaf are similar in both infected and uninfected disks, and the bulk of the nitrogen incorporated into the virus protein appears to be withdrawn from this pool, virus being formed *de novo* from ammonium nitrogen and non-nitrogenous carbon sources. The influence of the disease on host nitrogen metabolism is attributed to the process of virus formation rather than to the actual presence of the infected principle.

SUHOV (K. S.) & VOVK (A. M.). **The variability of Tobacco mosaic virus after culture in plant organisms of different host species.**—Труд. Инст. Генст., Ленингр. [*Proc. Inst. Genet., Leningr.*], *1950*, 18, pp. 215–236, 1950. [Russian. Abs. in *Plant Breed. Abstr.*, 22, 2, pp. 197–198, 1952.]

A description is given of the changes observed in tobacco mosaic virus, including variation in virulence, after culture in different hosts. The initial strain became more virulent after inoculation into and reproduction in *Nicotiana glauca*, *N. longiflora*, and *N. sylvestris*, and less virulent after culture in *N. lancifolia* and *N. noctiflora*. It is concluded that heritable changes occurring in viruses after culture in different hosts account for the origin of some races in nature.

BAUDET (J.), CROISSANT (O.), DERVICHIAN (D. G.), JOLY (M.), & MOSSÉ (J.). **Variation of the size and of the size distribution of Tobacco mosaic virus particles depending on the method of preparation.**—*Disc. Farad. Soc.*, *1951*, 11, pp. 236–246, 5 graphs, [? 1952].

At the Pasteur Institute, Paris, a study of a large number of samples of tobacco mosaic virus [*R.A.M.*, 31, p. 634] by electron microscopy and streaming birefringence showed that the preparation and the treatments involved in the different purification procedures greatly influence the length of the particles and their polydispersity. In the original sap these were very different from sample to sample but the same treatment tended to shift the most frequent size in the same direction. Thus sulphate increased and hydrochloric acid decreased the size, while phosphate tended to make it more uniform. The length 3,000 Å was the one most frequently encountered in all samples and treatments but it represented only 17 per cent. of the total number of particles.

Segretain (G.). **Action du lait de Coco et de l'acide naphtalène acétique sur la multiplication d'un virus en culture de tissus.** [Action of Coco-nut milk and naphthalene acetic acid on the multiplication of a virus in tissue culture.]—*C. R. Acad. Sci., Paris*, 235, 21, pp. 1342–1344, 1952.

The addition of 10 per cent. coco-nut milk to cultures of tobacco mosaic virus in tobacco tissues with crown gall [*Bacterium tumefaciens*: *R.A.M.*, 30, p. 198] promoted the development of the virus, and a comparable but slighter action was exerted by naphthalene acetic acid at a low (1×10^{-8}) or medium (5×10^{-7}) concentration. A mixture of the two substances did not influence the multiplication of the virus but stimulated the growth of the tissue.

Pavillard (J.). **Recherches sur la croissance des plantes virosées : virus et auxines.** [Studies on the growth of virus-infected plants: virus and auxins.]—*C. R. Acad. Sci., Paris*, 235, 1, pp. 87–88, 1952.

In experiments to ascertain whether the stunting of growth characteristic of numerous plant viroses is associated with a diminished auxin content, Merveille des Marchés tomato plants in the six- to seven-leaf stage were inoculated with tobacco mosaic virus [see next abstract]. There was a definite parallelism between the dwarfing of the plants and the decrease in the auxin content, which set in as soon as the virus had completed its spread [cf. *R.A.M.*, 29, p. 179]. A strict correlation between the two variables, however, could not be established, the auxin content undergoing much wider fluctuations than the stature of the plants [cf. ibid., 23, p. 46; 31, p. 137].

Pavillard (J.). **Recherches sur la croissance des plantes virosées. II. Influence des facteurs d'environnement.** [Studies on the growth of virus-infected plants. II. Influence of environmental factors.]—*C. R. Acad. Sci., Paris*, 235, 23, pp. 1527–1529, 1 graph, 1952.

In further studies in 1952 on the development of tobacco mosaic virus in Merveille des Marchés tomato plants [see preceding abstract], early spring inoculation (21st March to 24th April) resulted in considerable stunting of the newly formed shoots and the production of filiform leaves, while plants inoculated in the early summer (5th May to 22nd June and 16th June to 6th July) were not appreciably reduced in size but very markedly mottled. Thus, the development of the disease falls into at least two phases, the first conditioned by the specific activity of the virus and the second by the operation on the latter of ecological factors, such as light and temperature.

Armitage (H. M.). **Controlling curly top virus in agricultural crops by reducing populations of overwintering Beet leafhoppers.**—*J. econ. Ent.*, 45, 3, pp. 432–435, 3 figs., 1952.

Following a general survey of the problem of beet curly top virus control in tomatoes and other agricultural crops in California [*R.A.M.*, 31, p. 447], an account is given of experiments carried out for the extirpation of Russian thistle [*Salsola kali*], the joint host of the virus and its leafhopper vector, *Circulifer tenellus* [*Eutettix tenella*]. In 1950 564,000 gals. spray were applied between 1st October and 1st November to 141,000 acres at a rate of 1·5 lb. DDT in 4 gals. diesel oil per acre. The average percentage of infection on tomato in seven counties in San Joaquin Valley was reduced from 43·8 in 1950 to 5·2 in 1951, the corresponding figures for Monterey (Salinas Valley) being from 31·1 to 2·3, while the five-year averages (for 1946 to 1950) were 27·9 and 26·9 for the two areas, respectively. In 1951 the amount of DDT was reduced to 1 lb. and the oil to 2 gals. per acre and the operations covered the period from 5th to 15th October. The outcome was comparable to that of 1950.

The over-all incidence of infection in the areas protected by spraying was estimated at 0 to 30 per cent. compared with a normal range of 36 to 100 in similar untreated areas. In the spring of 1950 the losses incurred by growers of early table tomatoes in certain critical zones approximated to 100 per cent., representing several million dollars, whereas in 1951, following the spraying, the incidence of infection was well below 10 per cent. and a full crop was harvested. The average percentage of curly top in late canning tomatoes was less than 1, as against a normal expectancy of 20. The annual legislative appropriation for spraying against curly top averages $100,000, to which a further $250,000 had to be added in 1950 and 1951 for the emergency measures against Russian thistle. The need for this extra contribution will presumably continue as long as the present thistle stand persists.

Costa (A. S.). **Further studies on Tomato curly top in Brazil.**—*Phytopathology*, 42, 7, pp. 396–403, 2 figs., 1952.

Besides the Brazilian variety of the sugar beet curly top virus (*Ruga verrucosans* var. *brasiliensis*), another virus causes symptoms of curly top in tomato plantings in São Paulo [*R.A.M.*, 29, p. 127] which are indistinguishable from those induced by the former. The new virus is transmissible by the leafhoppers *Agalliana ensigera* and *A. sticticollis* and more easily by grafting than the Brazilian variety, but not by its vector *Agallia albidula*, by mechanical methods, or through the seed. The insects fed and bred well on many plants and were satisfactorily reared in cages on sunflowers, immune from the virus. *Agalliana ensigera* throve on tomatoes, which were not, however, readily colonized by *A. sticticollis*. Single-insect inoculation with *A. ensigera* resulted in 50 to 60 per cent. transmission, the females being more efficient than the males. The incubation period ranged from 16 to 24 hours. The virus was retained for 46 days by leafhoppers feeding on immune plants, and for 31 by those transferred daily on a series of tomato seedlings. It was not transmitted from viruliferous parents to their progeny through the eggs. The only plants, besides tomato, found to be susceptible to the new curly top virus were *Lycopersicum pimpinellifolium*, *Datura stramonium*, and *Solanum nigrum*.

Notwithstanding host range and aphid vector differences between the two viruses, the new one is considered to be a variety of the sugar beet curly top virus complex and is accordingly designated *R. verrucosans* var. *solanacearum*.

Maraiama (S. J.). **Uma nova e terrível peste do Tomateiro.** [A new and formidable Tomato scourge.]—*Chacaras e Quint.*, 84, 1, pp. 44–45, 1951. [Abs. in *Biol. Abstr.*, 26, 3, p. 684, 1952.]

An unidentified *Septoria* sp., not *S. lycopersici*, is attacking tomatoes in São Paulo, Brazil. Neutral Bordeaux mixture is the only fungicide showing promise of control.

Leben (C.). **A method for clearing leaves.**—*Phytopathology*, 42, 7, p. 352, 1952.

At the Department of Plant Pathology, University of Wisconsin, Madison, decolorization of tomato leaves to facilitate the observation of spore germination of *Alternaria solani* was effected in less than an hour by placing a small section to soak in 10 to 20 ml. pyridine. The process could be still further expedited by several successive immersions. The cleared section was mounted in lactophenol, with or without previous washing in water.

Gäumann (E.). **Über den Einfluss der Temperatur auf den Welke-Effekt beim toxigenen Welken.** [On the influence of temperature on the wilt effect in toxigenic wilting.]—*Phytopath. Z.*, 17, 4, pp. 330–333, 1 graph, 1951. [Received 1952.]

The methods and results of experiments to determine the influence of temperature

on the wilt induced in tomato by patulin [*R.A.M.*, 27, p. 453] are reported from the Federal Technical Institute, Zürich. Four-leaved shoots of plants of the Tuckswood variety, 25 cm. long, were left in a 10^{-3} M. solution of the antibiotic at 22° C. and 70 per cent. relative humidity, exposed to illumination from two fluorescent tubes, 1 m. long, at a distance of 60 cm., until the dosis minima of 22·5 mg. per kg. fresh weight had been taken up, a period of one to two hours. The shoots were then placed in water and maintained in darkness at different temperatures and a relative humidity of 55 to 70 per cent. for 48 hours, when readings of the wilt coefficients were made. In the stem and petiole tissues they rose from $1{\cdot}83 \pm 0{\cdot}63$ (on a scale of 0 to 4) at the minimum (14·9°) to $2{\cdot}23 \pm 0{\cdot}91$ at the highest temperature tested (29·2°), and in the leaf tissue from $1{\cdot}71 \pm 0{\cdot}59$ to $3{\cdot}04 \pm 0{\cdot}66$.

It would appear, therefore, that intensification of pathological symptoms under the influence of heat is not a specific attribute of the wilt associated with lycomarasmin [ibid., 29, p. 540], but occurs in the same way with patulin (quite a different type of toxin) and may, in fact, be a general phytopathological problem. Should this hypothesis prove to be correct, it might contribute to an explanation of the 'apoplexy' phenomenon in certain wilt diseases, especially of trees [cf. ibid., 30, p. 522], in which a long dormant infection suddenly culminates in collapse with the rising temperature of early summer.

Gattani (M. L.) & Kaul (T. N.). **Damping off of Tomato seedlings—its cause and control.**—*Indian Phytopath.*, 4, 2, pp. 156–161, 1951. [Received 1952.]

During July, 1948, a severe attack of pre- and post-emergence damping-off occurred in nursery tomato plots at the Imperial Agricultural Research Institute, New Delhi [cf. *R.A.M.*, 31, p. 540]. The causal organism was established in pathogenicity tests as being *Pythium aphanidermatum*. Dusting tomato seeds with cuprous oxide, copper sulphate (both at 1½ oz. per lb. seed), or ceresan (0·2 oz. per lb. seed), or soaking in 10 per cent. copper sulphate solution reduced the incidence of damping-off by 10, 11, 13, and 29 per cent., respectively. Soil disinfection with formaldehyde reduced it by 57 per cent. and, coupled with seed-soaking for one hour in 10 per cent. copper sulphate solution, by 63 per cent.

Moreau (C.) & Moreau (Mireille). **La 'suie' des Sycomores à Paris.** [The 'soot' of Sycamores in Paris.]—*Bull. Soc. mycol. Fr.*, 67 (*1951*), 4, pp. 404–418, 3 figs., 1952.

A full account is given of the authors' investigations on the so-called 'soot' disease, which by 1951 affected more than two-thirds of the sycamores (*Acer pseudoplatanus*) in the forest of Vincennes, Paris, and a similar proportion of those in the Bois de Boulogne [*R.A.M.*, 31, p. 638 and next abstract]. Symptoms are similar to those of sycamore sooty bark (*Cryptostroma corticale*) in England [ibid., 32, p. 109], except for a preliminary dwarfed appearance of the leaves on the top branches or some laterals, not recorded in England. *C. corticale* was found in the roots of apparently healthy trees and later in the bark and sometimes in the wood, producing abundant brown spores. The cambium of branches bearing dwarfed leaves contained stromata with perithecia of *Eutypa acharii* [ibid., 31, p. 638]. They are globose, 200 to 400 μ in diameter, with a subcylindrical to fusiform neck 200 to 450 by 75 to 150 μ, lined with periphyses. The claviform to fusiform asci, slightly invaginated at the apex, measure 40 to 60 by 4 to 6 μ, and the allantoid, hyaline ascospores, sometimes almost biseriate, 4 to 6 by 1 μ. Agglomerate pycnidia of *Cytospora acharii* with cylindrical, straight or arcuate, hyaline spores 15 to 17 by 1 to 1·5 μ develope dsuperficially in the stroma next to, but never over, the perithecia.

Cultures grown from *Cryptostroma* conidia or from stromatal fragments yielded phialides and conidia; those from asci of *E. acharii* produced only *Cytospora*

pycnidia. It remains to be ascertained, therefore, if *E. acharii* and *Cryptostroma corticale* are related. If so, the sudden appearance of the disease could be explained by a mutation which transformed the saprophyte *E. acharii* into a parasite. If the forms are not related, the fact remains that *E. acharii* has been found in the cambium of a living tree, where its pathogenicity is not negligible.

JACQUIOT (C.). **Maladie de la suie du Sycomore (Acer pseudoplatanus L.). Étude anatomique du bois.** [Soot disease of Sycamore (*Acer pseudoplatanus* L.). Anatomical study of the wood.]—*Bull. Soc. mycol. Fr.*, 67 (*1951*), 4, pp. 436–437, 4 figs., 1952.

The woody tissues of sycamore trees affected by 'soot' disease [see preceding abstract] contained hyphae of various fungi, including basidiomycetes. Many cells were completely delignified and obstructed by gum. A striking feature was the almost complete absence of tyloses, the necrosis caused by the pathogen being so destructive that it allowed no reaction by the living tissues.

CHESTERS (C. G. C.). **On the succession of microfungi associated with the decay of logs and branches.**—*Trans. Lincs. nat. Un.*, 12, 3, pp. 129–133, 6 pl., 1950.

In this presidential address delivered at Lincoln on 18th March, 1950, the author gives an account of the primary and secondary fungal colonists of dead or fallen branches or logs of deciduous trees, chiefly pyrenomycetes [see next abstract] and some basidiomycetes [*R.A.M.*, 31, p. 208].

WEBSTER (J.). **Common Pyrenomycetes of Beech wood.**—*Naturalist, Lond., 1953* (844), pp. 1–16, 2 figs., 1953.

A list, with descriptive notes, is given of the common pyrenomycetes on beech wood in Great Britain [*R.A.M.*, 29, p. 536 and preceding abstract]. Artificial keys to the genera and species are given and an index of the species.

FISCHER (F.). **Massnahmen gegen das Kastaniensterben im Tessin. Bericht pro 1951.** [Measures against the dying of Chestnuts in Ticino. Report for 1951.]—*Schweiz. Z. Forstw.*, 103, 3, pp. 103–106, 2 figs., 1952.

Chestnut blight (*Endothia parasitica*) is stated to be spreading rapidly in Switzerland [*R.A.M.*, 31, p. 463] and by the end of 1951 about 50 foci of infection had been detected. The simplest means of combating the disease would be the introduction of the resistant *Castanea mollissima*, but among the objections to this course are the susceptibility of the species to *Chalara quercina* [ibid., 31, p. 357], not hitherto recorded in Europe. The only method practicable at present is that of selection by vegetative propagation, preliminary experiments in which by a modified shoot-layering procedure have given very promising results.

ANDERSON (R. L.). **Factors influencing the incidence of Hypoxylon canker of Aspen.**—*Diss. Abstr.*, 12, 4, pp. 368–369, 1952. [Mimeoprinted.]

An attempt was made to determine the epidemiology and control of canker (*Hypoxylon pruinatum*) [*R.A.M.*, 31, p. 39] of aspen [*Populus* spp.] by studying environmental factors, host vigour, and stand conditions in relation to disease incidence in 211 $\frac{1}{10}$-acre plots in the Lake States region of the United States. For the greater part incidence was calculated for each plot, the plots being grouped in categories, and an average incidence obtained for each category. Incidence estimates were based on killing cankers rather than on non-killing ones.

Of the living trees 4·2 per cent. were infected with killing cankers, incidence ranging from 1·8 per cent. in the extreme north of Minnesota to 4·8 to 6·1 per cent. elsewhere in the region; it was less in old stands. There was a marked correlation

between low stand density and a high incidence, which tends to substantiate the theory that relative exposure of the bark area may be an important factor. The presence of other tree species, especially an understory of hardwoods, was associated with high incidence. There was some evidence that incidence was lower in stands containing conifers and where surface drainage and general moisture relations were good, internal drainage poor, the virgin forest type not climax conifers, and the site not frequently or severely burned. Incidence was also slightly lower in second generation stands, indicating that there may be some natural selection for resistance.

[An abstract of this paper appears in *Phytopathology*, 42, 9, p. 463. 1952.]

Itô (K.) & Kontani (S.). **The causal fungus of the web-blight of leguminous woody plants.**—*Bull. For. Exp. Sta. Meguro* 54, pp. 45–78, 6 pl., 7 figs., 1952. [Japanese, with English summary.]

In the summer of 1948 a web blight killing all or part of the aerial parts of the plant was observed on *Amorpha fruticosa* seedlings in the Yamagata prefecture, northern Japan, and has since appeared in other districts on *Robinia pseudoacacia* and its varieties *umbraculifera* and *bessoniana*.

First groups of web-blighted leaves appeared on both the upper and lower parts of the plants early in July, and became increasingly prevalent until September. Newly attacked leaves, still green, were covered with whitish, powdery patches on all or part of the lower leaf surface. At a more advanced stage the leaves exhibited large, necrotic areas, the lower surface being covered by a brown, hyphal web. Heavy losses occurred during periods of high temperature and high relative humidity. Finally, sclerotia began to form on severely affected parts. Field observations and laboratory tests demonstrated that basidiospore production was closely correlated with air temperature and relative humidity.

In morphology the fungus agreed with both *Corticium vagum* [*C. solani*: *R.A.M.*, 31, p. 153] and *C. sasakii* [ibid., 31, p. 83], but appears more likely to be a strain of the former since neither this nor the new fungus was pathogenic to rice plants, while *C. sasakii* attacked them severely, producing typical sheath spot [loc. cit.].

Bhattacharyya (B.), Datta (A.), & Baruah (H. K.). **On the formation and development of agaru in Aquillaria agallocha.**—*Sci. & Cult.*, 18, 5, pp. 240–241, 2 figs., 1 graph, 1952.

In studies at the Department of Botany, Gauhati University, India, on the formation and extraction of agaru perfume from agar wood (*Aquillaria agallocha*) a fungus, identified as *Epicoccum granulatum* [*R.A.M.*, 26, p. 267], was isolated repeatedly from wood exuding the aromatic, resinous product. On Dox's synthetic agar medium the fungus was characterized by its buff-red colour and darkish brown reaction. Anatomical investigations of both naturally and artificially infected wood showed that the walls of the elements were delignified, hyphae and yellowish brown oil drops being present inside the resinous cavities.

Neilson Jones (W.). **Fused needle disease in Pinus palustris.**—*Emp. For. Rev.*, 31, 4, pp. 325–326, 1 pl., 1952.

Pinus palustris is reported to be an additional suscept for fused needle disease of pines [*R.A.M.*, 25, p. 373]. In May, 1952, a small planting of this species at Wareham, Dorset, transplanted from a sowing made in the Forestry Commission Research Nursery in spring, 1948, showed 63 per cent. infection. In all cases the needles affected were among those produced towards the end of the 1950 growing season and still unshed in 1952, symptom expression coinciding for the most part with the removal of the plants from the nursery. It is assumed, therefore, that this operation interfered temporarily with water absorption by the roots, and provides additional evidence that the disorder results from a limiting supply of water.

Boyce (J. S.). **Scirrhia acicola, a cause of Loblolly Pine needle browning.**—Abs. in *Phytopathology*, 42, 5, p. 282, 1952.

The pathogenicity of *Scirrhia acicola*, present on loblolly pine [*Pinus taeda*] in North and South Carolina and Georgia [*R.A.M.*, 30, p. 639], to the needles was demonstrated by the inoculation with aqueous suspensions of monoconidial cultures in a series of experiments covering the period from February to the end of August, 1951. The seedlings were kept in 'iceless' refrigerators for several days after spraying. Die-back developed and acervuli were produced two to five months later on many needles that had attained at least one-third of their final length at the time of inoculation.

Lindeberg (G.) & Holm (Gisela). **Occurrence of tyrosinase and laccase in fruit bodies and mycelia of some hymenomycetes.**—*Physiol. Plant.*, 5, pp. 100–114, 6 graphs, 1952.

Further studies at the Royal Agricultural College, Uppsala, Sweden, on the occurrence of phenol oxidases [see next abstract] in the sporophores and mycelia of various litter-decomposing, coprophilous, and mycorrhizal hymenomycetes [*R.A.M.*, 30, p. 137] are described. The last-named group was represented by *Boletus versipellis* and *Lactarius deliciosus*; the fruit bodies and mycelium of the former contained only tyrosinase and those of the latter laccase with the addition of small amounts of tyrosinase in the fruit bodies. Laccase was detected in the mycelia of all the other fungi studied.

Lindeberg (G.) & Fåhraeus (G.). **Nature and formation of phenol oxidases in Polyporus zonatus and P. versicolor.**—*Physiol. Plant.*, 5, pp. 277–283, 1 graph, 1952.

Polyporus zonatus [*R.A.M.*, 29, p. 45] and *P.* [*Polystictus*] *versicolor*, typical representatives of the white rot group of fungi, form phenol oxidases of the laccase type [see preceding abstract]. In both species the production of the enzyme is mainly extracellular and increases with rising pH, especially in *P. zonatus*. A comparable effect may be obtained by the addition to the medium of potassium iodide (33 mg. per l.), which permits only a slow growth of the mycelium.

Wilkins (V. E.). **Report of the working party appointed to consider the danger to European countries of pests and diseases which may be introduced from outside, and to recommend appropriate preventive measures.**—11 pp., Paris, 14, Rue Cardinal Mercier, 1951. [French and English texts.]

An appendix to this report lists some extra-European plant pests and diseases which, it is considered, would cause serious losses if they became established in Europe, with recommendations as to how they should be kept out. The introduction of peach yellows virus [C.M.I. map No. 60; cf. *R.A.M.*, 25, p. 566] and other virus diseases of stone fruit trees, and potato viruses, including spindle tuber [cf. ibid., 26, p. 80], should be prevented by field inspection in the exporting country and post-entry quarantine. *Prunus americana* and *P. virginiana* should be excluded by embargo. For elm phloem necrosis virus [C.M.I. map No. 107] and rose wilt virus [*R.A.M.*, 23, pp. 18, 180] and other virus diseases of these hosts there should be post-entry quarantine. Against beet curly top virus [C.M.I. map No. 24] governments are advised to issue a warning to the effect that beet plants for breeding or other purposes should not be imported, especially from affected areas in North America.

There is danger of introducing *Chalara quercina* on oak or *Castanea mollissima* [see above, p. 222], *Helminthosporium victoriae* [*R.A.M.*, 26, p. 99] with seed of grasses and new oat varieties, and *Xanthomonas malvacearum* [C.M.I. map No. 57] and *Nematospora gossypii* [ibid., No. 153] with cotton seed.